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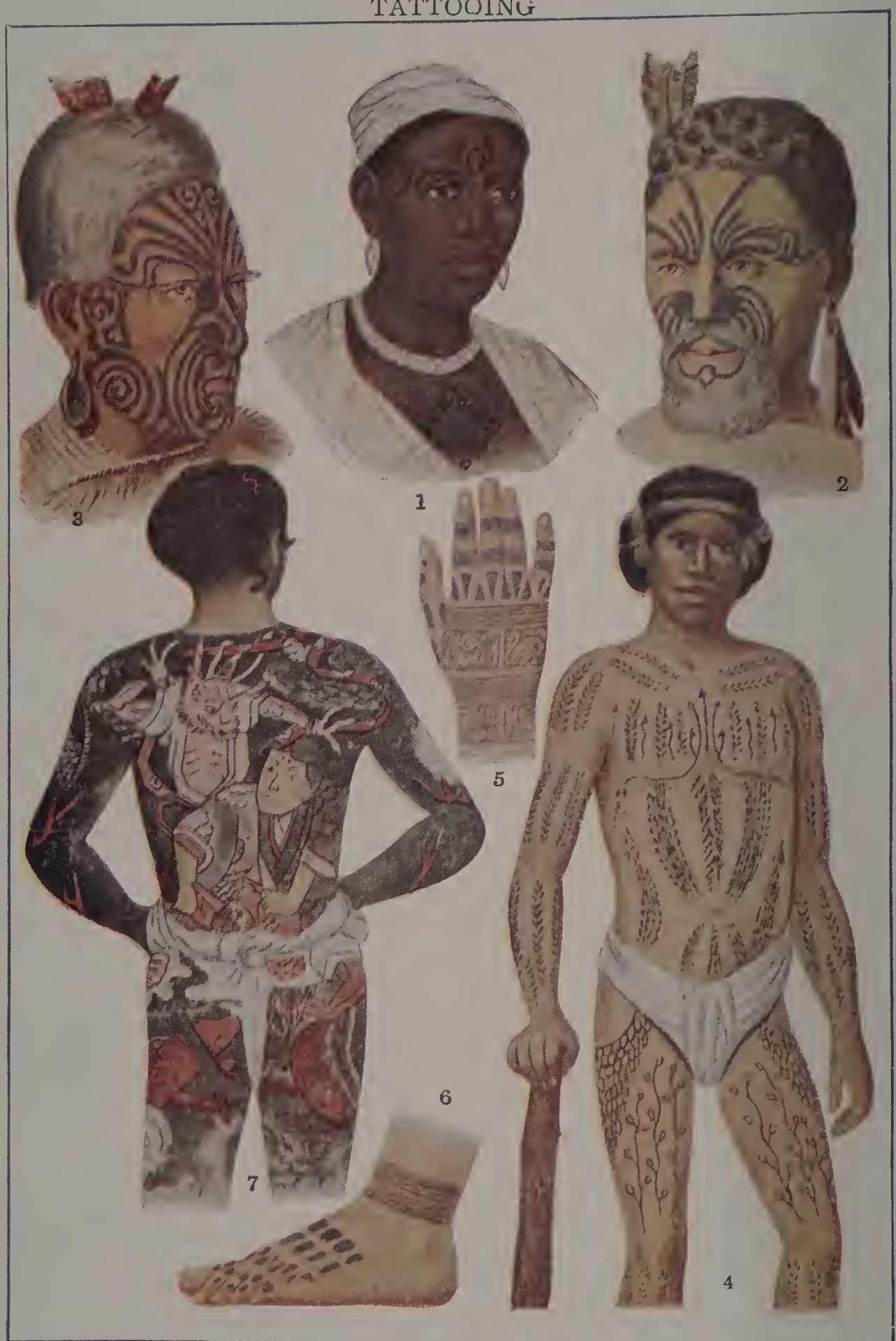

1. Sudanese Negro Woman. 2, 3. Maoris of New Zealand. 4. Caroline Islander. 5, 6. Hand and Foot of a Dyak of Borneo. 7. Japanese.

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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(-) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thėr.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr, stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ö	Goethe (similar to *e* in her)	*gö′tėh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
û	full, push, good	*fûl, pûsh, gûd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hī′dėl-bĕrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jĕm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prĕs.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
th	though, breathe	*thō, brēth.*
z	zeal, maze muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

-STER, suf. *stėr:* termination denoting occupation, e.g., in maltster, gamester, huckster, etc. Till the end of the 13th c. the suffix *-ster* denoted the feminine gender, and by its means new feminines could always be formed from the masculine. In the 14th c. the suffix *-ster* began to give place to the Norman-French *-ess,* and there is consequently lack of uniformity in its use. In modern English there is only one feminine with this suffix, spinster, though huckster was used very late as a feminine, and sewster is still used in Scotland and in provincial dialects. When the original feminine force of the suffix *-ster* was forgotten or lost, some new feminines were formed from English feminines by the addition of the French suffix *-ess,* e.g., seamster, seamstress, songster, songstress, which are really double feminines.

STER-: see STEREO-.

STERCORACEOUS, a. *stėr'kō-rā'shŭs* [L. *stercus,* dung, *stercŏris,* of dung]: pertaining to dung; resembling dung. STER'CORA'RIUM, n. *-rĭ-ŭm* [mid. L.]: a privy; a dunghill. STER'CORA'RIAN, n. *-ăn,* or STER'CORANIST, n. *-răn-ĭst,* in the *Chh. of Rome,* one who held that the Host is liable to digestion and all its consequences like other food STER'CORA'RIANISM, n. *-rā'rĭ-ăn-ĭzm,* the doctrine that the Host is digested like other food, contemptuously applied.

STERCULIACEÆ, *stėr-kū-lĭ-ā'sē-ē:* natural order of exogenous plants, closely allied to *Malvaceæ* and *Byttneriaceæ,* and consisting of large trees and shrubs, natives of warm climates. About 130 species are known. The flowers of some are irregular; and in some they are hermaphrodite, in others unisexual. Here belongs the Theobroma or Chocolate Tree. The *Mahernia Verticillata,* from the Cape of Good Hope, is a favorite house-plant, a slender woody plant, with sweet-scented, honey-yellow flowers, produced all winter and spring. Many species, particularly of sub-order *Bombaceæ,* are trees of gigantic size, among which is the Baobab or *Adansonia* (q.v.) *digitata.* The bark of some species is very fibrous, so that it is made into ropes and coarse cloth. The light wood of *Ochroma lagopus* is used in the W. Indies instead of cork. *Sterculia fœtida,* Indian tree, with excessively fetid flowers, has pale wood, very durable, and susceptible of high polish: spars of this wood are called *Poon Spars.* The seeds of some species, as of the Silk-cotton (q.v.) trees, are surrounded with silky hairs. The seeds of all the species are oleaginous; those of some are eatable, e.g. the CHICHA (*Sterculia chicha* and *S. lasiantha*) of Brazil, which are about the size of a pigeon's egg, and have pleasant flavor: they are roasted before being eaten. The Cola Nut (q.v.) of Africa is the seed of a *Sterculia.* The whole order agrees with *Malvaceæ* in possessing mucilaginous and demulcent properties. The Gum Tragacanth (q.v.) of Senegal and Sierra Leone is produced by a *Sterculia.* The Durian (q.v.) is the fruit of a tree of this order.

STERE, n. *stēr* or *stär* [F. *stère*—from Gr. *sterĕŏs*, firm, solid]: in *France*, the unit for solid measure, a cubic *mètre*, and equivalent to 35·3165818168 cubic ft. or 1·3080215487 cubic yards (see METRE). The *decastère* is equal to 10 steres, and the *decistère* to the tenth part of a stere. This measure is much used for firewood.

STERELMINTHA, *stĕr-ĕl-mĭn'tha* [Gr. *stereos*, solid, and *helmins*, an intestinal worm] term suggested by Prof. Owen, generally adopted to signify those intestinal worms which have no true abdominal cavity, and which were called 'parenchymatous' by Cuvier: see CŒLELMINTHA.

STEREO-, prefix, *stĕr-ĕ-o* or *stēr-ĕ-o* [Gr. *stereos*, solid]: solid; having an appearance of solidity.

STEREO, n. *stĕr'ĕ-ō:* a common contraction for STEREOTYPE, which see. STEREOS, n. plu. *stē'rĕ-ōz.*

STEREOCHROME, n. *stĕr'ĕ-ō-krōm*, or STER'EOCHRO'MY, n. *-krō'mĭ* [Gr. *sterĕŏs*, solid; *chrōma*, color]. imitation of fresco-painting, or substitute for it, in which the colors are indelibly fixed by a varnish of a soluble glass: see GLASS—*Soluble:* FRESCO.

STEREOGRAPHY, n. *stĕr'ĕ-ŏg'rā-fĭ* [Gr. *sterĕŏs*, solid; *graphō*, I write]: the act or art of delineating the forms of solid bodies on a plane. STER'EOGRAPH'IC, a. *-ō-grăf'ĭk*, or STER'EOGRAPH'ICAL, a. *-ĭ-kăl*, done according to the rules of stereography; delineated on a plane. STER'EOGRAPH'ICALLY, ad. *-lĭ.*

STEREOLEPIS, *stĕr-ĕ-ŏl'ĕ-pĭs:* genus of fish, represented on the Pacific coast by *S. gigas*, there confusingly called Jew-fish, and sometimes Black Sea bass. It attains 500 lbs. weight, ranges from the Farallone Islands to San Diego, and when small enough to be available brings a high market price.

STEREOMETER, n. *stĕr'ĕ-ŏm'ĕ-tĕr* [Gr. *sterĕŏs*, solid; *metron*, a measure]: an instr for measuring the specific gravities of various substances, solid as well as liquid. STER'EOM'ETRY, n. *-ĕ-trĭ*, the art of measuring solid bodies; the art or process of finding the specific gravity of certain substances. STER'EOMET'RICAL, a. *-ō-mĕt'rĭ-kăl*, pertaining to or performed by stereometry. STER'EOMET'RICALLY, ad. *-kăl-lĭ.*

STEREOPTICON, n. *stĕr'ĕ-ŏp'tĭ-kŏn* [Gr. *stereos*, solid, firm, *optikos*, of sight]: double magic lantern, of which the two objective tubes can be focussed on the same part of a screen. It is used to bring one image after another on the screen by the alternate use of the lanterns. See DISSOLVING VIEWS.

STEREOSCOPE, n. *stĕr'ĕ-ō-skōp* [Gr. *sterèŏs*, solid, *skopĕō*, I view]: optical instr. through which two objects or views that have been photographed at a certain angle appear as one, and standing out in a solid form as in nature. STER'EOSCOP'IC, a. *-skŏp'ĭk*, pert. to the stereoscope, or adapted to it. STER'EOS'COPIST, n. *-ŏs'kō-pĭst*, one skilled in the use or construction of the stereoscope. STER'EOS'COPY, n. *-pĭ*, the art or science of using the stereoscope or of constructing it.—The *Stereoscope* is an invention by means of which pictures of objects possessing three dimensions, are seen not as plane representations, but with an appearance of solidity or relief, as in ordinary vision of the objects themselves. For the more recondite principles of the S., which are of interest and importance in their bearing on the philosophy of Perception (q.v.), see VISION, BINOCULAR. The present article deals with its history, and with the optical and mechanical details of its construction.

The essential principle of the S., whose first conception by Prof. Wheatstone ranks as a brilliant optical discovery, may thus be explained. It is obvious that the eyes being separated by a certain interval of space, all solid objects so near to the observer as to be seen with a sensible convergence of the optic axes, necessarily form retinal pictures, differing as to their perspective projections for each eye. The true import of this fact was unsuspected prior to the investigations of Prof. Wheatstone, who, in his first paper on this subject, in *Philosophical Transactions* 1838, established the conclusion that this dissimilarity of the retinal images has an important use in our visual organs—that it is, in fact, the principal origin of our immediate perception of the solidity (or relief) of objects adjacent to the sight. To test by experiment the question: 'What would be the visual effect of simultaneously presenting to each eye, instead of the object itself, its projection on a plane surface as it appears to that eye?' he devised the S., which as improved by him is shown in fig. 1.

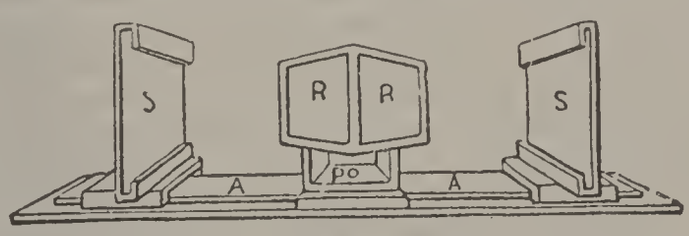


Fig. 1:

R, R, two square mirrors about three inches in diameter, fixed vertically with their backs at a right angle with each other; S, S, slides for the reception of the pictures, the *left*-hand picture being placed in the *right*-hand slide, and *vice versa*, on account of the lateral inversion of their reflected images. S, S are made to slide along the arms A, A, so that their distance from R, R, may be varied at pleasure. S, S also revolve each on a vertical axis, to admit of the variation of their angular position with reference to the arms A, A. A, A may also be moved in a horizontal plane, on the common pivot, P.

The pictures being attached to the slides, the observer places himself with his nose close to, and immediately in front of, the vertical angle made by the reflectors, so that

the view by each eye is limited to the rays reflected by its appropriate mirror; the pictures are then seen, as it were, behind the mirrors, and the eyes being made slightly to converge, either by an effort of the will, or by drawing the slides, S, S, a little forward, the effect of either of which is to refer the reflected images to the same part of space, the observer sees no longer mere pictorial resemblances, but, to all appearance, the objects themselves, exquisitely modelled, occupying a certain extent of space, and with an aspect strikingly substantial.

The ultimate philosophy of the illusions of stereoscopy is that there is mental construction of the images as solid, from the force of habit, just as, with the eyes shut, the mind constructs forms through the sense of touch. With the two pictures exchanged in place—the right put in place of the left and *vice versa*—a convex surface will appear concave, for example, simply because we are accustomed to associate concavity with the point of view presented by the combined image.

At the outset, the only stereoscopic pictures obtainable were the outlines of geometrical solid figures, depicted with perspective projections adapted for the right and left eye respectively; these excited great admiration. The modifications of crystals have been well represented by this means. In 1849, Sir David Brewster originated the form of S. now in general use. For this—the lenticular S.—the pictures from two different points of view are mounted side by side, on a piece of cardboard, and, being placed in the instrument, are viewed through semi-lenses, fixed at the distance apart of the two eyes. To effect the displacement of the pictures, essential for their being referred to the same part of space, Sir David Brewster availed himself of an optical principle, by which also he fulfilled several collateral ends. This principle may be described as follows: If an object be viewed through the centre, or, more properly, along the axis, of a convex lens, it will be seen exactly in front of the eye; i.e., in a line with the eye, the centre of the lens, and the actual place of the object. If now the lens be moved slightly to the left, the object will appear to advance toward the right; and, conversely, as the lens is moved toward the right, the object is displaced in the opposite direction. Let the lens be cut in half, transversely, and the two semi-circular pieces reversed as to their former position, i.e., placed side by side, and so that their thin edges shall be adjacent while the two plane edges, formed by the section of the lens, are kept in mutual parallelism, and have their faces turned outward, toward the left and right respectively: the right eye will now look through the left half of the lens, and *vice versa;* and the two pictures, each placed opposite its appropriate eye, and in the principal focus of the eye-piece will be seen, not in their actual places, but in a position midway between the two The subsidiary purposes served by this arrangement are, that the pictures are magnified as well as caused to coalesce; and that the equality of the magnifying power of the eye-pieces (a result by no other means certainly attainable)

is secured by the fact of their being cut from the same lens, the whole of which is thus advantageously and economically utilized. In many imperfect instruments the conditions stated above are inadequately fulfilled; the parallelism of the two sectional planes of the semi-lenses, and their rectangularity with two imaginary planes joining their opposite ends respectively, are not maintained; as a consequence, the coalescence of the pictures is effected, if at all, by a forced and more or less painful displacement of the eye

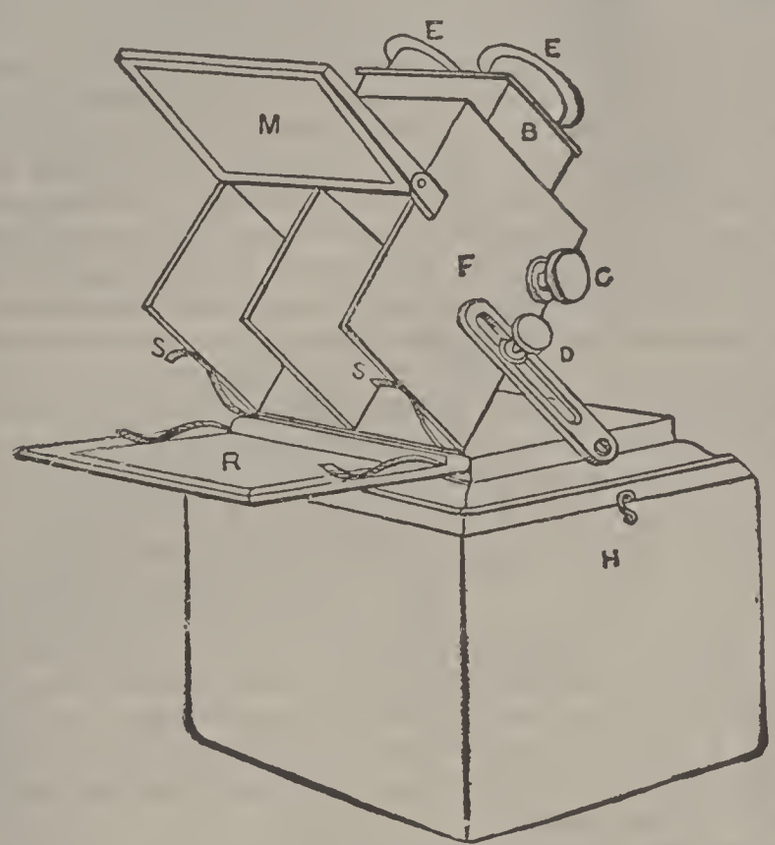


Fig. 2:

E, E, the eye-pieces fitted to the sliding-box, B, which, by means of the milled head, C, attached to a rack-and-pinion movement, can be moved out or in for adjusting the focus. D, a slot and screw for fixing the body of the stereoscope, F, at any desired inclination; M, a mirror for reflecting light upon the picture, which is inserted between the springs, S, S, and the woodwork of the stereoscope, and is thus firmly held. For viewing transparencies, the flap containing M is closed, and the picture illuminated by light reflected through it by the mirror, R, the inclination of which is adjustable at pleasure; H is a box forming a convenient receptacle for the whole of the instrument.

balls. This parallelism of the sides of the semi-lenses may be either actual or virtual; for to whatever shape they may be cut (the circular is usual), the foregoing conditions are not altered. An achromatic S. is shown in fig. 2.

It remains to speak of the pictures in their relation one to the other as a stereoscopic pair. To reproduce exactly the conditions of normal vision, they should be taken from points of view separated laterally by a space equal to the distance between the eyes, about 2½ inches; and for objects within narrow limits this rule is observed. But for wider range, e.g., an extensive architectural pile, photographs

take their pictures usually from spots separated by a considerable interval; and the stereoscopic slides thus obtained give very striking effects of solidity or relief. Inasmuch, however, as these effects are due to a gross exaggeration of the ordinary difference of perspective relatively to the two eyes, they to a like extent misrepresent the actual scene; and on the whole it is better to conform to the conditions of natural binocular vision. The pictures should be mounted in exactly the same line. As the apparent solidity of the objects viewed in the S. conflicts with the evident flatness of the cardboard mount, it is advantageous to adopt the following expedient. The pictures must be of the same size, but instead of having them identically the same as regards the objects represented on each, let the left-hand picture include on its left-hand margin somewhat less than is found on the same margin of the right-hand picture; similarly, let its right-hand margin contain somewhat more than is found on the same margin of the right-hand picture; then will the view appear to extend well out of and beyond the cardboard, which forms, as it were, a framework around it. This ingenious arrangement does but reproduce the conditions which obtain whenever we look out on a scene through a casement a few feet away. Warren De La Rue availing himself of the libration of the moon, has obtained lunar stereoscopic photographs, which exhibit the moon with a general rotundity, while the objects on its surface are seen in conspicuous relief. These effects are due to an exaggeration of the 'binocular parallax;' for by no human eyes, how near soever they might be placed to the lunar surface, could such a view be obtained: it is, as Sir John Herschel has remarked, as though the moon were seen with the eyes of a giant, placed thousands of miles apart.

Among minor applications of the S. are the STEREOMONOSCOPE and the STEREOTROPE. In the stereomonoscope, the two pictures of a stereoscopic pair are projected, by lenses, on to the posterior surface of a piece of ground glass, one upon the other, or so that they occupy the same place; when the observer, looking from the opposite side of the glass, sees them not as a confused mixture of two pictures, but as a single stereoscopic representation, possessing the usual attributes of solidity or relief. The stereotrope consists in an application of the principle of the S. to that class of instruments variously termed thaumatropes, phenakistoscopes, etc., which depend for their results on 'persistence of vision.' In these instruments an object represented on a revolving disk in the successive positions that it assumes in performing a given evolution, is seen to execute the movement so delineated; in the stereotrope, the effect of solidity is superadded, so that the object is seen as if in motion, and with an appearance of relief as in nature: see ZOETROPE. Swann made an ingenious application of stereoscopy to portraiture; Hardie proposed a reflecting stereoscope, in which the planes of reflection are vertical. The stereoscope has been found of value in examining forged bank-notes or printed papers. See Brewster, *The S.*

(1856); Helmholtz, *Physiol. Optik*, and his *Popular Lectures on Scientific Subjects* (transl. 1874).

The most important application of the stereoscopic principle is in the binocular microscope. In this, the right and left eye pictures, respectively, are thus obtained: immediately behind the object-glass, a small peculiarly shaped prism is placed in such position that it shall receive all the rays coming through the right half of the lens. These rays, after being twice reflected within the body of the prism, finally emerge at such an angle to their original direction that they cross the undiverted pencil of rays transmitted by the other half of the lens, and are then received into a second tube, which, being inclined to the first or main tube at an appropriate angle, conveys them to the left eye; while the other complement of rays pursues an undeviating course to the right eye. Each of the two tubes is fitted with the usual eye-pieces; and object-glasses of all but the highest powers may be used with pleasure and advantage.

STEREOSCOPIC SLIDE: a slip of cardboard on which are mounted side by side two photographs of the same scene or object. Theoretically, these photographs should be taken by similar lenses from points of view separated by a space equal to the distance between the human eyes, but in practice the space is increased in order to procure a greater effect.

STEREOTOMY, n. *stĕr'ĕ-ŏt'ō-mĭ* [Gr. *sterĕŏs*, solid; *tomē*, a cutting]: the art of cutting solids into certain figures or sections. STER'EOTOM'IC, a. *-tŏm'ĭk*, pertaining to.

STEREOTROPE: a mechanism by which an object is perceived as if in motion, and with an appearance of solidity or relief as in nature. It consists of a series of stereoscopic pictures, generally eight, of an object in the successive positions it assumes in completing any motion, affixed to an octagonal drum, revolving under an ordinary lenticular stereoscope, and viewed through a solid cylinder pierced in the entire length of two apertures, which makes four revolutions for one of the picture drum.

STEREOTYPE, n. *stĕr'ĕ-ō-tīp* [Gr. *sterĕŏs*, solid; *tupos*, type, form]: a metal plate cast from a mold taken from one or more pages of movable types, for subsequent use in printing from: V. to cast metal plates from movable types: ADJ. printed from plates, as *stereotype* edition. STER'EOTYPING, imp.: N. the act or art of taking casts from movable types. STER'EOTYPED, pp. *-tīpt:* ADJ. fixed: unchangeable, as opinions. STER'EOTYPER, n. *-ėr*, one who casts stereotype plates. STER'EOTYP'IC, a. *-tĭp'-ĭk*, pertaining to. STER'EOTYPOG'RAPHY, n. *-tī-pŏg'rā-fĭ* [Gr. *graphō*, I write]: the art or business of stereotype printing. STER'EOTYPOG'RAPHER, n. *-rā-fėr*, a stereotype printer.

STEREOTYPING.

STER'EOTYPING: art of fabricating metal plates resembling pages of type, from which impressions may be taken as in ordinary letterpress printing (see TYPOGRAPHY). The plates, of type-metal, are about three-sixteenths of an inch thick, perfectly smooth on the back, and having a face exactly resembling a page of movable type. To yield an impression, the plates are fastened by a temporary arrangement to blocks of wood—plate and block together having the height of a type, or one inch. S. is not employed where only a definite and moderate number of impressions of any work are required. Its chief value is in its availableness for future impressions contingent on renewed demand, but it is important also in duplicating the means of taking large impressions quickly. The discovery of S. has been ascribed to Van der Mey, Dutch printer, who early in the 18th c. executed editions of the Bible from forms of fixed type: his process, however, was not S. in the proper sense; for it was merely soldering together all the types in a page to fix them permanently. The true inventor doubtless was William Ged (d. 1749), goldsmith in Edinburgh, about 1725. By him in association with others, Bibles and Prayer-books were stereotyped for the Univ. of Cambridge about 1731. Ged's prospects were blighted by the malice of the pressmen employed to print from his plates, which they damaged and rendered imperfect, so that their use was abandoned, and they were sent to be melted. Ged, in disappointment, returned to Edinburgh, where he executed several editions of Sallust, probably the first book correctly printed from stereotype plates. Copies still exist.

The art has undergone little change since its discovery. In the well-known *stucco* process, the page of type being set, corrected, cleaned, and fixed in a frame, is laid on a smooth iron table, face upward; a little fine oil is brushed over it, to prevent the liquid stucco from adhering; the stucco to the consistency of cream is poured over the face of the page, and straightened over it in the process of hardening; when hardened, the cake of stucco is lifted off, and is seen to be a perfect mold of the types. The cake is baked in an oven, then placed in an iron pan; the pan, which has inlets at the upper side, is plunged into molten metal, which soon runs into the mold; being lifted out and cooled, the pan is opened and found to contain a plate resembling the page of type; the mold is of no further use. When removed from the pan, the plate is rough, and needs to be trimmed for the press. Should any particular letter be defective, it is dug out, and a corresponding type inserted; the end of which type is cut off at the back of the plate by a soldering bolt. In preparing plates for press, nothing is more important than giving a high degree of level smoothness to the back by planing and smoothing. After the S. is finished, the types are distributed. In the process the types deteriorate—their finer parts being rounded off. In some printing-offices, all work is executed from plates, and types are used only to produce molds. Impressions from stereotype plates are seldom so

sharp and fine as from pages of movable letter; yet S. answers every required purpose in a large variety of cases. Plates properly manufactured, stored, and mended when necessary, will last for repeated impressions to the extent of hundreds of thousands over a long series of years. The stock of plates in some establishments is accordingly large, and represents a considerable capital. When no longer required, the plates are melted down as material for fresh castings.

The *paper* process of S., invented on the continent of Europe, is used in some form by most of the great daily journals. Its general method is the following. A uniform sheet of soft and damp matter is formed by gumming together, first, a sheet of thin yet very tough tissue paper; second, a sheet of loose and bibulous white paper; third, a sheet of fine-grained and tough brown paper. The smooth and white side of the sheet, still soft and moist, is placed on the types: both are then put in a press. A roller passes under the form, and presses it up against the paper, so as to take the impression of the types and convert it into a mold. The dents made by the types rise on the outside of the paper, so that any spot where the paper has not sunk into the spaces between the types is at once detected: such spots generally occur, and are removed by the paper being driven in between the types by blows of a hard brush. The dents made by the types are represented by elevations on the outside of the sheet, while the interstices are represented by corresponding hollows. The latter are filled up at this stage by a thin coating of stucco laid on by a brush. The mold is then carefully removed, dried, and placed in a shallow box of metal placed upright. The smooth or stucco side of the mold is pushed against the back of the box: the lid is then closed very tightly, leaving only an opening at the top. Through this opening molten metal is poured, and a plate is thus formed, one side of which is a cast from the mold. It contains elevations at places where there are wide spaces between the types, and these it is necessary to remove with the chisel: in other respects the plate is an exact copy of the form. The great advantage of this mode is its rapidity. Plates from stucco could scarcely be produced and ready for press in less than six hours; plates from paper can be produced and laid on the machine in seven minutes. The forms of types themselves are no longer used; a number of plates being produced corresponding to the number of machines employed, all the copies of the paper are printed from them, effecting a very great saving in cost of types. It was necessary to renew the font every few months in some offices when papers were printed directly from types. Now the types last as many years as they did months when printed from. To accommodate printing machines on which the forms need to be fixed in a cylinder, the paper molds are placed in pans or boxes of the required shape. The molds are then bent with their backs outward, and the molten metal is poured between the concave mold and convex lid. The plates are cast generally in

four segments, which screwed together form a cylinder. They are adjusted to the printing press by a planing machine, which cuts their inner surface to the exact convexity of the cylinder. To this duplication there is no limit; sets of plates can be produced to any required number. As copies of old newspapers are not wanted, the plates are melted down as soon as the operations of the day are over. Even when books are printed from movable types, it may serve a good purpose to take paper molds from them before distribution; for the molds, on being dried, can be laid aside, and be afterward employed for fabricating plates should a new impression be wanted. The author of a book could at insignificant addition to the expense of typography, possess himself of a set of paper molds of his work, to be used at some future period, thus saving the composition for a new edition.

A modification of the S. process which has obtained considerable application is known as the chalk-plate process, for producing engravings. A plate of steel is covered with a chalk-like composition, for which numerous formulæ have been given. In general, a mixture of ground talc or its equivalent with some cementing material may be used: silicate-of-sodium solution, or flour-paste may be the cement; with this the plates are coated to a thickness of about one-sixteenth of an inch. The surface of the plate may first be slightly roughened and flowed over with albumen to secure adherence. The artist sketches his design on the chalk-plate, when dry, with a steel stylus, cutting clear through to the metal always. This is used as a matrix, and on it type-metal is cast to give a relief-plate.

Electrotyping is now extensively used instead of S.: it gives a more durable and finer plate.—See TYPOGRAPHY.

STERIGMATA, n. plu. *stĕr-ĭg'mă-tă* [Gr. *stērigma*, a prop or support]: in *bot.*, cells bearing naked spores; cellular filaments to which spores or spermatia are attached, as in the spermagones of lichens.

STERILE, a. *stĕr'ĭl* [F. *stérile*—from L. *sterĭlis*, barren: It. *sterile*]: barren; unfruitful; unproductive; barren of ideas. STERILITY, n. *stĕr-ĭl'ĭ-tĭ*, barrenness; unfruitfulness; state of not producing young, as animals.

STERILIZE, vt. *stĕr'ĭl-īz:* to deprive of productive or reproductive power; render barren; cause to be fruitless: sometimes used figuratively; as, to *sterilize* the soul;—also, to destroy bacteria or other micro-organisms in; as, to *sterilize* an infusion by boiling (see BACTERIA). STERILIZATION, n. *stĕr-ĭl-ĭ-zā'shŭn:* act or process of destroying germs in milk by heating to just below the boiling-point. *Pasteurization* is the act or process of destroying germs by heating considerably below the boiling-point.

STER'LET: see STURGEON.

STERLING, a. *stĕr'lĭng* [originally the name of the English penny, the standard coin; subsequently applied to the coinage of England in general—from the *Esterlings* or North Germans, who first made money in England]: of standard value; genuine; sound; pure; of excellent quality.

sterling is an epithet generally applied to the money of the United Kingdom. The original standard of money was weight, and among the Anglo-Saxon and Teutonic nations the basis of weight was in early times supplied by the wheat-corn. Charlemagne superseded the earlier systems by a new coinage, in which a pound of 12 ounces became the money-weight, each pound being divided into 20 solidi, and each solidus into 12 denarii of the weight of 32 wheat-corns. The older *silfer* or scruple of 24 wheat-corns being superseded by the penny of 32 wheat-corns, the term sterling seems to have been applied to the latter, in consequence of its being in use among the Ripuarian or Austrasian Franks, sometimes called the *Easterlings,* while the old scruple continued to be used by the Northmen. In England, where the change was early introduced, the word came to indicate the fineness or standard of the silver; and nearly the same standard, consisting of 11 oz. 2 dwt. of pure silver, and 18 dwt. of alloy to the pound troy, or $\frac{18}{222}$ dwt., seems to have subsisted from the 12th century onward. The superiority of the English standard silver as currency has been generally acknowledged in Europe; hence the adjective sterling has become a synonym for pure, genuine, and solid.

STERLING, *stėr'lĭng:* city in Whiteside co., Ill.; on Rock river, and on the Chicago and Northwestern and the Chicago, Burlington and Quincy railroads; 52 m. e.n.e. of Rock Island, 110 m. w. of Chicago. It derives excellent water power from the river; has various manufactories, banks, public library, and daily and semi-weekly newspapers. Pop. (1900) 6,309.

STERN, a. *stėrn* [Dut. *stuursch,* stern: Icel, *stúra,* sorrow: Norw. *sturen,* sorrowful, cast down: comp. Ger. *starr,* rigid, stiff]: severe in countenance, in manners, or in feeling; harsh; unrelenting; steadfast, as *stern* virtue; in *OE.,* hard; afflictive. STERN'LY, ad. *-lĭ.* STERN'NESS, n. *-nĕs,* the quality or state of being stern; rigor; severity.—SYN. of 'stern': severe; austere; rigid; rigorous; cruel; unrelenting; immovable.

STERN, n. *stėrn* [Icel. *styra,* to steer; *stiorn,* steerage: Dut. *stuur,* rudder (see STEER 1)]: the after-part of a ship: *familiarly,* the hinder-part of anything; in *OE.,* the post of management; direction. STERN-BOARD, the backward motion of a vessel. STERN-CHASER, a cannon in the stern. STERN-FAST, a rope to hold the stern of a ship. STERN-PORT, a port or opening in the stern. STERN-POST, a straight piece of timber which terminates the ship behind and supports the rudder. STERN-SHEETS, the part of a boat between the stern and the rowers where the passengers sit. STERN-WAY, the movement of a ship backward. BY THE STERN, deeply laden at the stern. STERN'-MOST, a. furthest astern.

STERN, SIMON ADLER: American author and banker: b. Philadelphia 1838, Dec. 8; d. 1904. He was educated in the high school, and in 1871 became associated with

two of his brothers in the printing and publishing firm of Edward Stern & Co. He was treasurer of the Finance Company of Pennsylvania 1887-1903. In addition to many contributions on literature and music to the current periodicals, he published: *Scintillations from the Prose Works of Heinrich Heine* (1873); translations of Auerbach's *Woldfield* (1873), and *On the Heights* (1875); and *Jottings of Travel in China and Japan* (1888).

STERNBERG, George Miller: American surgeon: b. Otsego co., N. Y., 1838, June 8. He was graduated from the College of Physicians and Surgeons, New York, 1860. He was appointed assistant surgeon in the United States army 1861, and received the commission of brigadier-general, and surgeon-general in 1893. His first service during the Civil war was with the Army of the Potomac and later with the Army of the Gulf. After the war he served through yellow fever and cholera epidemics, and during the war with Spain (1898), had command of the medical service. He was a member of the Havana Yellow Fever Commission (1879), and president of the American Medical Association (1898). He has published *Photo-Micrographs, and How to Make Them* (1883); *Bacteria, Malaria and Malarial Diseases* (1884); *Manual of Bacteriology* (1893); *Immunity, Protective Inoculations, and Serum-Therapy* (1897); etc.

STERNBURG, Hermann von Speck: German diplomat: b. Leeds, England, 1852, Aug. 21; d. 1908, Aug. 24. He was educated at the Fürstenschule St. Afra, Meissen, Saxony, and the military academy of Potsdam; fought through the Franco-Prussian war in the Second Saxon dragoons, and remained in the military service until 1885. In 1890 he entered on his diplomatic career, being made successively first secretary of legation at Peking, *chargé d'affaires* at Belgrade, Servia, and first secretary of the embassy at Washington. In 1898 he was high commissioner on the Samoan commission (see Samoa). He was made consul-general for British India and Ceylon in 1900, minister plenipotentiary and envoy extraordinary to the United States in 1903, and ambassador in July, 1903.

STERNE, Adolphus: Texan pioneer: b. Cologne, Germany, 1801, Apr. 5; d. New Orleans, La., 1852, Mar. 27. Leaving his birthplace in his 16th year to escape military duty, he came to the United States, going first to New Orleans and then visiting Texas in 1824. A lover of adventure and proficient in many languages and dialects, he joined the English settlers in their early struggles against the Mexicans, and took part in the Fredonian war. Saved from being sentenced to death by an amnesty, he went into business at Nacogdoches, and became a notable figure in eastern Texas. He studied law, was court interpreter, and after Texas won her independence he served in both upper and lower houses of congress.

STERNE, *stèrn*, LAURENCE: 1713, Nov. 24—1768, Mar. 18; b. Clonmel, Ireland; son of an Eng. officer, and great grandson of an abp. of York. Much of his boyhood was passed in Ireland, in abodes that shifted with his father's regt., with possibly some effect in developing the comical and reckless oddity and whimsical exuberance long afterward shown in his character and writings. When about ten years old, the boy was consigned to the care of a kinsman in Yorkshire, was by him put to school near Halifax, and thence was transferred 1733 to Jesus College, Cambridge, where 1736 and 40 respectively he took the degrees B.A. and M.A. He was educated for the Anglican priesthood, and on his leaving the univ., his uncle, the Rev. Jaques S., an ecclesiastical dignitary, procured for him the living of Sutton in Yorkshire. With this relative he afterward quarrelled, but not before another appointment had been secured him as prebendary of York Cathedral. In 1741 he was married to a lady whom he met in York; and soon, through the influence of a friend of his wife, he was presented to the additional living of Stillington. Nearly 20 years he lived at Sutton unheard of. That his devotion to his clerical duties was great is more than can be supposed from what we know of his character; and we can readily believe that his choice recreations were, as he says, 'books, painting, fiddling, and shooting.' Till 1759, in which the first two vols. of his *Tristram Shandy* appeared, he had published only two sermons, which according to his own statement, 'found neither purchasers nor readers.' *Tristram Shandy*, which, though published without his name, was from the first known to be his, had instant and immense success; and S., on going up to London, found himself the literary lion of the day. In 1761 two more vols. of it appeared, followed by vols. V., VI. in 1762, vols. VII., VIII. in 1765, and in 1767 by IX., the last. During this period he issued 4 vols. of sermons 'by Yorick;' and the *Sentimental Journey*, 1768, completes the list of his works.

From the time of his becoming famous his parishioners saw S. but little. He lived mostly either on the continent or in London, where his literary celebrity made him welcome in the best circles. Always an easy, mercurial kind of mortal, he now led a gay life, modelled on the Epicurean maxim of enjoying the present hour, rather than on those more serious precepts that he had been wont to enforce from the pulpit. But except that he does not seem to have been excessively devoted to his own wife—she and her daughter being in these pleasant years but little with him—and was a little of a sentimental Lothario in relation to the wives of other people, no very great harm is known of him. He is said, despite the exquisite sentiment which abounds in his writings, to have been really heartless and unfeeling; and the sneer of Walpole that he could snivel over a dead ass to the neglect of his live mother, is familiar; though indeed the implied slander has no distinct evidence.

Whatever question may be made of the worth of S. as a

man, there can be none of his genius as a writer. *Tristram Shandy*, his chief work, must live as long as the language, were it only in virtue of the three characters, Old Shandy, Uncle Toby, and Trim, among the most perfect and exquisite in the whole range of British fiction. These are genuine creations, at once fantastic and real, in which the subtlest reconcilement is effected between the sportive exuberance of fancy and the sober outlines of truth. Otherwise there is in the work much which needs excuse; in particular, a wilful and gratuitous indecency almost without parallel; and a constant trick of lawless and whimsical digression, to whose endless and incalculable frivolities even the inimitable grace, ease, and tricksy flexibility of the style can hardly reconcile the reader. The humor of S. is the most subtle, airy, delicate, and tender in our literature; and in many passages he shows himself master of a pathos equally exquisite and refined, and quite irresistible. Though against the charge of unclerical levity, at once in his writings and his life, it is impossible to defend S. except as the laxer *morale* of his time may afford palliation of it, candid investigation suggests a considerably more kindly view of his character than that formerly current. Traill's short life of S. (1882) stands midway between Fitzgerald's apology (*Life*, 1864) and Thackeray's unsparing attack.

STERNHOLD, *stĕrn'hōld*, THOMAS: one of the authors of the version of the Psalms formerly attached to the English Book of Common Prayer: b. Hampshire, England, toward the close of the 15th c. He held the office of groom of the robes to Henry VIII. and Edward VI., and died 1549. At the Reformation period, when the practice of singing metrical psalms—introduced by Clement Marot among the gay courtiers of Francis I.—came to be taken up by the Reformers, S. undertook to render the whole book of Psalms into English verse. He lived to complete only 21 psalms; and his version was published after his death under the title of *All such Psalm of David as Thomas Sternhold did in his Lyfe drawe into English metre* (Lond. 1549). S.'s labors were completed by John Hopkins and William Whittinghame, and first annexed to the Book of Common Prayer with the music attached, as *The Whole Booke of Psalmes, collected into English metre by Thomas Sternhold, John Hopkins, and others; compared with the Ebrue, with Notes to sing withal.* S. and Hopkins's psalms are very literal, but coarse and homely in phraseology. They were used in the church service of England till superseded by the version of Tate and Brady (pub. 1698), and in use in Scotland till the middle of the 17th century.

STERN'IDÆ: see TERN.

STERNO, *stĕr'nō* [Gr. *sternon*, the breast]: a prefix to some scientific terms, denoting relation to the sternum or breast-bone. STERNOCOS'TAL, a. *-kŏs'tăl* [L. *costa*, a rib]: belonging to the region of the ribs; attached to the sternum.

STERNUM, n. *stĕr'nŭm* [Gr. *sternon*, the breast, the chest]: the flat bone of the breast to which the ribs are jointed in front; the breastbone. STER'NAL, a. *-năl*, pertaining to the sternum.—See SKELETON.

STERNUTATION, n. *stėr'nū-tā'shŭn* [L. *sternūto*, I sneeze]: the act of sneezing. STERNU'TATIVE, a. *-nū'tă-tĭv*, provocative of sneezing. STERNU'TATORY, a. *-tėr-ĭ*, having the quality of provoking sneezing. STERNU'TATORIES, n. agents which cause sneezing. The most common are various kinds of snuffs, but other substances are known which produce a more powerful and prolonged action on the nasal mucous membrane. Their uses in medicine are various; e.g., to restore suspended respiration in fainting, to dislodge foreign bodies from the nasal passages or even from the windpipe, to avert or check hysterical attacks, and to terminate prolonged fits of hiccup. They are now seldom used.

STERTOR, n. *stėr'tŏr* [L. *sterto*, I snore]: the deep snoring which accompanies respiration in certain diseases. STERTOROUS, a. *stėr'tŏr-ŭs*, applied to the deep snoring, as in apoplexy, compression of the brain, etc.

STET, phrase, *stĕt* [L., let it stand]: in *print.*, word written in the margin of a proof directing attention to a portion of the matter, and countermanding an order to expunge it; a series of dots made below the matter has the same effect. S. is often used as a verb, e.g., to *stet* a passage.

STETHOMETER, n. *stĕth-ŏm'ĕ-tėr* [Gr. *stēthos*, the breast; *metron*, a measure]: in *med.*, an instr. for measuring the capacity, and determining the form, of the chest.

STETHOSCOPE, n. *stĕth'ō-skōp* [Gr. *stēthos*, the breast; *skopeō*, I view]: tube of light wood or gutta-percha, with one end funnel-shaped, used by medical men for listening to the sounds produced in the chest or other cavities of the body. STETH'OSCOPIC, a. *-skŏp'ĭk*, pert. to the stethoscope, or made by means of it. STETHOSCOPY, n. *stĕth-ŏs'kŏ-pĭ*, the art of stethoscopic examination.—The *stethoscope* was invented by Laennec for examining the sounds of the chest. Its simplest form is shown in the figure, which represents the section reduced to half the natural diameter, or one-eighth of the actual size. The upper part is the chest end, the lower the ear-piece. An improved form has two curved branches ending in small knobs, which are inserted in the ears of the auscultator. The most convenient dimensions are—length, 7 inches; diameter of ear-piece, 3 inches; circumference of shaft, 1¼ inch: diameter of chest end, 1¼ inch. The main object of the S. being to circumscribe and localize the sounds which it transmits, the chest end should be small, in order to determine the exact seat of the greatest intensity of sound. To ascertain this, the instrument should be moved right and left, up and down, till its end is on the exact spot from which proceeds the abnormal sound for which we are searching—or, it may be, at which the absence of sound is located. See AUSCULTATION. In construction the following points

Stethoscope.

should be attended to: 1. It should be composed of a material which allows the least amount of sound to be lost, and which least of all modifies or prevents the sound. A porous wood, such as cedar or deal, answers these conditions best, a dense wood, like ebony, having a tendency to modify the sound. 2, It should be of one piece of wood, not, e.g., part ivory and part cedar. 3. The ear-piece should be large and flat to secure perfect apposition and occlusion, and the chest end should be narrow and smoothly rounded over the edge. For the various sounds heard through the S., see PERCUSSION: RESPIRATORY SOUNDS: PNEUMONIA. ETC.—Also, see PHONENDOSCOPE.

STETTIN, *stĕt-tēn':* ancient town of Prussia, cap. of the province of Pomerania (*Pommern*), and, after Danzig, the most important seaport in the kingdom; on the left bank of the Oder (q.v.), where it flows into the Stettiner-Haff; 30 m. from the Baltic Sea, 83 m. n.e. of Berlin, with which it is connected by railway. Across the river, here 12 to 16 ft. deep, is the suburb of Lastadie, connected with S. proper by two bridges. Outside the fortifications are the suburbs Upper and Lower Wieck and Tornei. The site of the town is hilly and the streets are uneven; but the houses are good and the environs very pleasant. The principal buildings are the castle or fortress, the govt. house, the 'county buildings' with valuable library, the exchange, and theatre. The manufactures are very important; the chief silks, leather, sail-cloth, cottons, etc. There is also a large anchor foundry, where all the anchors for Prussian ships are forged. Ship-building and manufacture of machinery employ many workmen; and the commerce of the city is extensive and increasing. S. is the port whence mainly the products of Silesia, natural and artificial, are shipped to other countries. Grain, wood, and brandy are principal exports. The annual value of exports is about $37,000,000; imports, about $30,000,000. In 1885 there entered, 3,809 ocean vessels (2,207 steamers), besides 1,965 coasters and river craft, and 10,039 barges.—S. was formerly a fortress of the first rank.—The *Stettiner-Haff* is an expansion of the river Oder, n. of S., and communicates with the Baltic Sea by three narrow straits, the most important of which is the Swine: see SWINEMUNDE. The Stettiner-Haff has an area of 200 sq. m., and a depth of 12 to 18 ft.—Pop. (1880) 91,756; (1885) 99,543; (1890) 116,000; (1900) 210,702.

S. the anc. *Sedinum*, later *Stettinum*, was of Slavic origin, became a flourishing commercial town in the middle ages, joined the Hansa (see HANSEATIC LEAGUE) 1360, and was repeatedly the residence of the Dukes of Pomerania.

STEUBEN, *stū'bĕn*, Ger. *stoy'bĕn*, FREDERIC WILLIAM AUGUSTUS, Baron: general of the American revolutionary army: 1730, Nov. 15—1794, Nov. 28; b. Magdeburg, Prussia. He was educated at the Jesuits' Colleges of Niesse and Breslau; and at the age of 14 served as volunteer under his father at the siege of Prague. In 1747 he was appointed cadet of infantry, and 1758 had risen to adjt.gen. He was wounded in the battle of Kunersdorf; and 1761 was con-

ducted as a prisoner of war to St. Petersbrug, but was soon released. In 1762 he was appointed adjt.gen. on the staff of the Prussian king, effected important reforms in the quartermaster's dept., and superintended an acad. of young officers. At the close of the Seven Years' War he travelled in Europe, and was appointed grand marshal and gen. of the guard of the Prince of Hohenzollern-Hechingen. Visiting Paris 1777, where the American colonies in rebellion were favored by the government, he was invited by Count St. Germain to go to America; arrived at Portsmouth, Va., 1777, Dec. 1, and offered his services to Gen. Washington, and joined the army. He was appointed inspector gen., prepared a manual of tactics for the army, remodelled its organization, and improved its discipline. He was one of the officers who composed the court-martial at the trial of Major André. In the campaign of 1780 he had a command in Va., and was on the staff of Gen. Lafayette at the siege of Yorktown. He spent his whole fortune in clothing his men, and gave his last dollar to his soldiers. Congress made tardy reparation, and 1790 voted him an annuity of $2,500, and a township of land in N. Y.—See Sparks's *American Biography*, and Life by Friedrich Kapp (New York 1860).

STEUBENVILLE, *stū'bén-vĭl:* city, cap. of Jefferson co., O.; on the Ohio river, and on the Pittsburgh Cincinnati Chicago and St. Louis, the Wheeling and Lake Erie and the Cleveland and Pittsburgh railroads; 43 m. w. of Pittsburgh. It was named from Fort Steuben, a block-house built on its site about 1770 and abandoned 1787; settled 1797; and made a city 1851. It is on an elevated plain overlooking the river, which is here crossed by a railroad bridge and is the centre of a large bituminous coal-field; there are also large quarries, petroleum wells, and clay deposits in the vicinity. Farming and stock-raising are carried on extensively in its vicinity. The city has improved water and sewage systems, gas and electric light plants, co. court house in e. O., numerous churches, high school, public and parish schools, private commercial schools, a Carnegie Public Library, and school libraries, 2 national banks and 2 priv. banks. The Gill Hospital and the local charitable organizations care for the sick and needy. The chief manufacturing establishments are iron and steel works, soap works, tin plate and clay works, potteries, foundries, glass factories, blast furnaces, a paper mill, flour mills, boiler works, tube works, machine-shops, and nail factories. The census of 1900 gives the number of manufacturing establishments, 171; the amount of capital invested, $2,587,180; the number of employees, 2,051; amount of wages, $874,095; cost of material used, $2,698,875; and value of products annually, $5,235,161. Brick works near the city form part of the industries. Pop. (1910) 22,391.

STEVEDORE, n. *stē'vĕ-dōr*, or STIVADORE, n. *stĭv'ă-dōr* [Sp. *estivador*, a packer of wool—from *estivar*, to pack or stow—from L. *stipārĕ*, to press together]: one engaged in the stowage or unloading of ships.

STEVEN, n. *stē'vn* [AS. *stefn*, the voice]: in *OE.*, a cry; loud clamor; appointed time; appointment.

STEVENS, *stē'venz*, ABEL, D.D.: author: b. Philadelphia, 1805, Jan. 19; d. 1894, Dec. 3. He was educated in the Wesleyan University; was pastor in Methodist Episcopal churches at Boston and Providence; editor of *Zion's Herald*, Boston, 1840-52; editor of the *National Magazine*, New York, 1853-4, and of the *Christian Advocate*, New York, 1856; pastor in New York and Mamaroneck 1862-65; editor of the *Methodist* 1865-74; pastor of the Union Church, Geneva, Switzerland; also traveled much. His principal works are: *Essay on Church Polity* (1847); *Memorials of the Introduction of Methodism into the Eastern States* (1847-52); a prize essay, *The Great Reform* (1856); *History of the Religious Movement of the 18th Century, called Methodism* (1858-61); *History of the Methodist Episcopal Church in the United States* (1864-67); *The Women of Methodism—Its Three Foundresses* (1866); *Madame De Staël* (1881); *Character Sketches* (1882).

STE'VENS, EBENEZER: soldier of the revolution: 1751, Aug. 22—1823, Sept. 2; b. Boston. He was one in the famous party which destroyed a quantity of tea in Boston harbor 1773; he raised troops in Rhode Island, was in the expedition to seize Quebec, and was in command of the artillery at Ticonderoga, at Stillwater, and during a part of the siege of Yorktown. By various promotions he reached the rank of lieutenant-colonel. At the close of the war he entered mercantile business in New York, became a prominent citizen, and was made major-general of the state militia. He died at Rockaway, L. I.

STE'VENS, EDWARD: revolutionary soldier: 1745-1820, Aug. 17; b. in Culpeper co., Va. In 1776 he was appointed colonel of the 10th Va. regiment; in 1777, Oct., was commissioned brigadier-general, and was in the battles of Brandywine, Germantown, Camden, Guilford C. H., and at the siege of Yorktown. He was a state senator for Virginia for 14 years. He died in Culpeper co.

STE'VENS, EDWIN AUGUSTUS: 1795, July 28—1868, Aug. 8; b. Hoboken, N. J.; son of John Stevens (1749-1838). For some years he was engaged with his brother, Robert, in the construction and improvement of steamboats and their machinery. He also had control of the Union line, which was later chartered for the brothers by the state of New Jersey as the Camden & Amboy railroad: of this road Stevens was treasurer and general manager. With his brother he made many improvements in engines, cars, and railroad construction; in engines for steam-vessels; and in naval batteries and defenses.

He continued the latter work after his brother's death. During the civil war he built for the government a small twin-screw vessel, the *Naugatuck*, which could be almost entirely submerged, could be quickly raised to its ordinary level, and could be turned end for end in 75 seconds. He founded the Stevens Institute (q.v.) at Hoboken, to which he bequeathed the land required, with $150,000 for a building, and an endowment of $500,000. He died at Paris.

STE'VENS, Henry: 1819, Aug. 24—1886, Feb. 28; b. Barnet, Vt.; son of Henry Stevens. He graduated from Yale 1843, and began the study of law; but becoming interested in antiquarian matters went to London 1845 in the interest of collectors of historical books and MSS. In a short time he was engaged by the authorities of the British Museum to secure for them American books. He remained their agent through life, and also collected rare books for public and private libraries in this country. He made many valuable catalogues, edited works pertaining to early American history, and was a prolific writer, and an authority on biographical themes. Among his numerous works were: *Who Spoils Our New English Books?* (1885), and *Recollections of James Lenox* (1886). He died at South Hampstead, England.

STE'VENS, Isaac Ingalls: soldier: 1818, Mar. 25—1862, Sept. 1; b. Andover, Mass. He graduated at West Point 1839, and was assigned to the department of engineers as 2d lieutenant. He served in the Mexican war, and was brevetted captain for bravery at the battles of Contreras and Churubusco, and major at Chapultepec. 1849-53 he was in charge of the U. S. coast survey at Washington; 1857-61 delegate in congress from Washington Territory; 1861 colonel of the 79th N. Y. volunteers, and brigadier-general; 1862, July 4, major-general. He was killed near Chantilly, Va., at the head of his command.

STE'VENS, John: inventor: 1749-1838, Mar. 6; b. New York. After graduating from King's (now Columbia College, 1768, he studied law, was treasurer of New Jersey 1776-79, but gave most of his time to experiments and inventions. A petition which he offered to congress 1790 laid the foundation for the patent laws of this country. For many years he studied the problem of steam-navigation. With his son, Robert L. Stevens, he completed, a few days after Fulton's successful trial on the Hudson, a boat which was used several years on the Delaware, and was the first steam-vessel ever moved on the ocean. He opened the first steam-ferry in the world; was the first to use the screw form of propeller in a steam-vessel; made improvements in engines; projected a railroad between New York and Philadelphia, for which, 1815, he obtained the first charter ever granted for a railroad in the United States, though he did not build the road; and on a circular track which he con-

structed near his home he used the first locomotive ever run in this country. He died at Hoboken, N. J.

STE'VENS, JOHN AUSTIN: 1795, Jan. 22—1874, Oct. 19; b. New York; son of Ebenezer Stevens. He graduated from Yale 1813, became a partner with his father in mercantile business in New York 1818, was one of the founders of the merchants' exchange, of which he was the first president, was secretary of the chamber of commerce for several years, and president of the Bank of Commerce 27 years. In the Civil war he was an earnest supporter of the government and was chairman of the bankers' committee which, 1861, subscribed for a large portion of the 7-30 loan to the U. S. government.

STEVENS, JOHN F.: American engineer: b. Gardiner, Me., 1853, Apr. 25. After preparatory education he qualified for his chosen vocation by technical study, and in his twenty-first year became assistant engineer of the city of Minneapolis, two years later, in 1876, entering railway service to take charge of the surveys as chief engineer of the Sabine Pass & Northwestern railway. In 1879 he was appointed assistant engineer of the Denver & Rio Grande railway; in 1880 of the Chicago, Milwaukee & St. Paul railway; from 1882-86 was assistant and division engineer of the Canadian Pacific railway; in 1886 again returned to the Chicago, Milwaukee & St. Paul system as assistant engineer; from 1887-89 was principal assistant engineer of the Duluth, South Shore & Atlantic railroad; in 1889 assistant engineer of the Spokane Falls & Northern railroad; and from 1890-98 was with the Great Northern railroad, rising from principal assistant engineer to chief engineer, and accomplishing the work which established his reputation. While engineer of construction, he started from Assiniboine with two Indian guides and a pack mule to lay out the western extension line to the coast; notwithstanding the desertion of the Indians, and the death of his mule, he persevered in his task, and after severe hardships completed the work, mapping the route as now operated. Stevens Pass in the Cascade Mountains was named after him. After engaging in railway contracting, Stevens, in 1899, returned as general manager to the Great Northern railway and allied lines; and later became vice-president and general manager of the Rock Island system. He had been engaged as government railroad expert by the Philippine Commission for the projected construction of 1,000 miles of Philippine railways, when the resignation of J. F. Wallace led to Stevens accepting the appointment of chief engineer of the Panama Canal Commission and general manager of the Panama railroad, with residence and annual salary of $30,000, 1905, June 30. He resigned two years later to become vice-president of the N. Y., N. H. & H. railroad.

STEVENS, JOHN LEAVITT: American diplomat and author: b. Mount Vernon, Maine, 1820, Aug. 1; d. Au-

gusta, Maine, 1895, Feb. 8. In 1844 he was ordained in the Universalist ministry, but owing to ill-health, in 1854, was obliged to lay aside the arduous duties of that profession. In 1855 he associated himself with James G. Blaine on the 'Kennebec Journal'; from 1865-68 he was a member of the Maine legislature, and from 1868-70 sat in the state senate. In 1870 he was appointed minister from the United States to Paraguay and Uruguay, a post which he held until 1873; from 1877-83 he was minister from the United States to Norway and Sweden. In 1889 he was appointed minister to the Hawaiian Islands, and in 1890 his rank was raised to that of envoy extraordinary and minister plenipotentiary. He was, however, recalled by President Cleveland in 1893 because his course of procedure in connection with placing the islands, then in revolution, under the protection of the U. S. government was not approved. He wrote *The History of Gustavus Adolphus* (1884); etc.

STE'VENS, PHINEAS: soldier: 1707, Feb. 20—1756, Feb. 6; b. Sudbury, Mass. Part of his childhood was spent at Rutland, N. H., to which place his parents had removed; but at the age of 16 he was taken prisoner by the Indians. In 1746 he joined the expedition against Canada; rendered distinguished service to the English cause in holding Fort No. 4 at Charlestown, N. H., when it was attacked by French and Indians 1747; was sent to Canada 1749 and again 1752 to secure an exchange of prisoners; and died in Nova Scotia while with Col. Monckton's expedition against the French. His *Journal*, narrating his experiences in Canada 1749, appears in the *New Hampshire Historical Collections*.

STE'VENS, ROBERT LIVINGSTON: civil engineer and inventor: 1787, Oct. 18—1856, Apr. 20; b. Hoboken, N. J.; son of John Stevens (1749-1838). In 1808 he made the first sea-voyage by steam, taking to Philadelphia the *Phœnix*, which was completed a few days after Fulton's Hudson river steamboat, 1807. He continued building steamboats until, in 1832, he attained with the *North America* the rate of 15 m. an hour. Thence, for many years, he was the recognized chief in this line of work; and made many improvements, such as ferry-boats and ferry-docks, truss-frames, wrought-iron walking-beam, split water-wheel, tubular boilers, etc. In 1830 he led the way in adopting the T-rail in this country. He invented the first efficient percussion-shell, and with his brother experimented on cannon-bombs and ship-armor. The so-called 'Stevens battery,' an iron-clad for which the U. S. government contracted 1842, anticipated by many years the European, but continued to be a subject of experiment (later by Edwin A. Stevens), as guns of greater penetrating power, invented from time to time, rendered its armor insufficient. Stevens died at Hoboken, in the mansion long conspicuous on Castle Hill.

STE'VENS, THADDEUS: 1792, Apr. 4—1868, Aug. 11; b. Danville, Vt. With the disadvantages of poverty and ill-health, he found his way to the University of Vermont, graduating at Dartmouth 1814. While teaching at York, Pa., he studied law; began practice at Bel Air, Md.; removed to Gettysburg, Pa., 1816, and soon became noted in his profession. He opposed the second election of President Jackson. A member of the legislature 1833-35, he was active in saving the common-school system from its enemies. In the constitutional convention 1836, he advocated negro franchise. Again a member of the legislature 1837-8, he was a leader in the whig and anti-Mason body, after the division into rival organizations. In 1842 he removed to Lancaster, and was member of congress 1848-50, antagonizing the fugitive slave law and Clay's compromises. From 1858 to his death he was a member of the U. S. house of representatives, and much of the time its acknowledged radical leader, beloved by his friends and feared in debate by his enemies. The boldest resolutions and acts, during the war, were supported by him; and some, such as the 14th amendment, were originated by him. The proposal to impeach President Johnson, 1868, came from him. Reports that he was skeptical and profane he took occasion to correct. His charities were many, and his will made provision for an orphan asylum at Lancaster, with no distinction of color. His burial was in a separate plot of ground given with the same condition. His epitaph, written by himself, states his wish to be buried where there is no restriction of color.

STEVENS INSTITUTE OF TECHNOLOGY: school of mechanical engineering at Hoboken, N. J., founded by Edwin A. Stevens (q.v.), who left by will, at his death, 1868, Aug. 8, a block of land, a building fund of $150,000, and an endowment fund of $500,000, to establish both an institute and a school preparatory to the institute and to any college. The site is a fine one, on high ground on the bank of the Hudson, opposite New York. The school, with a large new building on the e. side of the institute campus, completed in the spring of 1888, gives a three years' preparatory course, to about 250 boys, thoroughly fitting not only for scientific schools but for college or for business. The institute was organized under Henry Morton, PH.D., who took the presidency 1870. The United States, under act of congress 1869, authorizing a collateral inheritance tax, deprived the Stevens Institute of $45,000, which has not yet been refunded. President Morton has made gifts to fit up the workshop with machine-tools (1881) $10,500; to supply apparatus for a department of applied electricity (1883) $2,500; and toward the endowment of a chair of engineering practice (1889) $10,000. Dr. Jacob Vreeland left to the Stevens Institute, 1888, funds aggregating $11,000. The high rank which the Stevens Institute has

taken, the distinction gained by its president and professors, the number of applicants for its advantages, only about half of whom can be received, indicate its need and its promise. New departments, new chairs, and scholarships are required. The full course occupies four years, and the degree conferred is that of mechanical engineer. The departments included in the course of study and drill are: mathematics and mechanics, physics, mechanical drawing, chemistry, with a cabinet of more than 3,000 specimens of ores, minerals, and rocks, analytical chemistry, engineering, experimental mechanics and shopwork, engineering practice, applied electricity, languages (Spanish and German), and belles-lettres. The workshop course includes visits to great establishments, where work on a large scale can be studied; and every senior class makes an extended tour of inspection through such centers of manufacturing as Bethlehem and Philadelphia, Pa.; Hartford, Conn.; Springfield, Boston, and Fall River, Mass.; and Providence, R. I. A special department of tests has been successfully maintained, to render any service by any kind of investigation for testing purposes—thus bringing study nearer to every-day demands. In this nearness of instruction to experience, and in the number of practical matters made familiar, the Stevens Institute course is not second to any. The faculty comprises 22 professors and instructors. The four classes number in the aggregate 297.

STEVENSON, Adlai Ewing: lawyer and politician: b. Christian co., Ky., 1835, Oct. 23. He studied law in Bloomington, Ill.; was admitted to the bar 1858; master in chancery 1861-65; state's attorney for the 22d judicial district 1864-68; fixed his residence in Bloomington, and was elected as a democrat to congress 1874-78; was first assistant postmaster-general 1885-89; and in 1893-97 was vice-president of the United States. He was a member of the commission appointed 1897 to try to secure international bi-metallism; in 1900 was an unsuccessful candidate for vice-president; and was democratic candidate for governor of Illinois 1908.

STEVENSON, *stē'vĕn-son*, Robert: Scotch engineer: 1772, June 8—1850, July 12; b. Glasgow. 1796 he succeeded his stepfather as engineer and inspector of light-houses; and during 47 years' tenure of that office planned and constructed no fewer than 23 light-houses round the Scottish coasts, employing the catoptric system of illumination, and his valuable invention of 'intermittent' and 'flashing' lights (see Light-house). The most remarkable of these erections was that on the Bell Rock (q.v.), quite unprecedented in light-house engineering, for in the only instance analogous—the Eddystone (q.v.) light-house—the rock was barely submerged at flood, while the Bell Rock was never uncovered except at very low ebb-tides. Stevenson was in great request also as consulting engineer in roads, bridges, harbors, canals, and railways;

introduced many improvements in their construction; and occasionally co-operated with Rennie, Telford, and others. He died in Edinburgh. Besides professional printed reports, Stevenson wrote a work on the Bell Rock Light-house, articles in *Encyclopædia Britannica* and *Edinburgh Encyclopædia*, and *Scots Magazine* (1817). See *Life* by his son, David Stevenson (1878).

STEVENSON, Robert Louis Balfour: Scottish novelist, poet, and essayist: b. Edinburgh, 1850, Nov. 13; d. Vailima, Samoa, 1894, Dec. 3. Having passed through the Edinburgh University (1871), he was called to the Scottish bar, being admitted a member of the faculty of advocates in 1875. Literature, however, turned out to be his real vocation. He had carefully trained himself in writing, playing, as he said, the 'sedulous ape' to various authors, and thus acquired a style which gave a marked distinction to everything he wrote. *An Inland Voyage* was the first of his books—a charming account of a canoe journey along some of the canals and rivers of northern France and Belgium, published in 1878. This was followed by *Travels with a Donkey in the Cevennes*, the record of a journey in southern France (1879); *Virginibus Puerisque and other Papers*, essays (1881); *Familiar studies of Men and Books*, which gave him established place as a critic of distinction (1882); and *New Arabian Nights* (1882), a series of fantastic tales exhibiting an odd mixture of the commonplace and the extravagant. *Treasure Island* next made its appearance (1883), a brilliant and realistic story of buccaneering days, which immensely widened Stevenson's circle of readers and admirers. *Prince Otto*, an essay in the field of pure romance, appeared in 1885; and the same year *A Child's Garden of Verse* proved how thoroughly the writer could enter into and express a child's thoughts and feelings. *The Strange Case of Dr. Jekyll and Mr. Hyde* (1886), based on the idea of a man possessing a double personality, achieved an extraordinary success with the public, became proverbial, and is, perhaps, at least by name, the most generally known of his writings. Then came *Kidnapped* (1886), an admirable story of a Scottish boy's adventures in the middle of the 18th c. In this field, where he found ample resources unused by Scott, he attained his highest level in fiction. The adventures of the hero of *Kidnapped* were continued in a subsequent tale, *David Balfour* (1893). To the same period and background belong *The Master of Ballantrae* (1893), a part of the action of which takes place in America, and the uncompleted *Weir of Hermiston* (1895), in which many critics believe he reached his finest achievement in this department. His volumes of verse, *Underwoods* (1887) and *Ballads* (1891), are of much interest, despite the fact that poetry was for him something of an avocation, 'an alien though cognate art.' A number of his shorter stories were published collect-

ively in *The Merry Men and other Tales and Fables* (1887); and in his *Memories and Portraits* (1887) were gathered a number of magazine articles having a certain autobiographical value. Stevenson's health was always precarious, and after various changes of residence, including one to Saranac Lake in the Adirondacks, he went to the southern Pacific in 1888 and finally settled in Samoa, where he died. His residence there supplied materials for the stories *The Island Nights' Entertainments* (1893) and *The Ebb-Tide* (1894), and *A Foot-Note to History: Eight Years of Trouble in Samoa* (1892) Other works were *The Black Arrow* (1888), and *St. Ives* (1897), completed by A. T. Quiller-Couch. Consult: his letters, edited by Colvin (1899), who prepared the 'Edinburgh' edition of his complete works (1894-8); the *Life* by Balfour (1901); Raleigh, *Stevenson* (1895); the studies by Cranford (1899) and Baildon (1901); and a large amount of periodical literature.

STE'VENS POINT: city, capital of Portage co., Wis.; on the Wisconsin river, and on the Wisconsin Central and the Green Bay, Winona & St. Paul railroads; 71 m. n. of Portage City, 85 m. w. of Green Bay. It is a supply and distributing point of one of the most valuable pine regions in the w.; has important lumber interests, and numerous saw, shingle, and planing mills; and contains several churches, public schools, Roman Catholic academy, banks, and weekly newspapers. The machine and repair shops of the Wisconsin Central railroad are here. Pop. (1900) 9,524.

STEW, v. *stū* [OF. *estuve,* a stove: Port. and Sp. *estufa,* a hothouse: Icel. *stofa;* Sw. *stufwa,* a heated, confined space, a hot bath: Low Ger. *staven,* to stew]. to boil slowly with a little water; to be boiled in a slow, gentle manner—simmering—with but little water: N. a vapor-bath; meat slowly boiled with but little water: in *OE.,* that which suffocates or stifles; that which chokes or stuffs; vapor; smoke; dust; a state of anxiety or confusion; a brothel. STEW'ING, imp. STEWED, pp. *stūd.*

STEWARD, n. *stū'ẹrd* [Icel. *stivardr,* the person who looks to the daily work of an establishment: AS. *stiward* —said to be from *stigo,* a sty; *weard,* a guardian]: one who manages the affairs of a landed estate; one who regulates the domestic concerns of a great family, termed a *house steward:* director of a public dinner, charitable festival, and the like: in a *ship,* the person who superintends the meals, etc.; a manager: in *Scrip.,* a minister of Christ. STEW'ARDESS, n. *-ĕs,* a woman who attends women traveling by vessel. STEW'ARDSHIP, n. *-shĭp,* the office of a steward; management.

STEWARD (or HIGH STEWARD) OF SCOTLAND (L. *Dapifer,* or *Seneschallus*): official of high dignity and power in Scotland. The office was early in the 12th c. conferred by David I. on Walter, whose chief pat-

rimony was the barony of Renfrew (q.v.); and the dignity of S. became hereditary in his family, who in virtue of their office assumed the surname Stewart (Stuart). The estates of the stewards afterward became the appanage of the king's eldest son, and 1469 the titles Prince and High Steward of Scotland, Duke of Rothesay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles, were vested in the eldest son and heir-apparent of the crown of Scotland forever. 'Great Steward of Scotland' has thus become one of the titles of the Prince of Wales. See STUART, ROYAL HOUSE OF.

STEWARD OF ENGLAND, LORD HIGH: one of the great officers of state, anciently the first officer of the crown. The dignity was in early times hereditary. The office was absorbed into the royal dignity on the accession of Henry IV., and there has since been no permanent lord steward; but the office is temporarily revived when occasion requires, e.g., at a coronation (see PARLIAMENT): when the proceedings are at an end, the lord steward terminates his commission by breaking his wand of office.

STEWARD OF THE HOUSEHOLD, LORD: official of the royal household in England, of great antiquity; originally designated the Lord Great Master of the Household. He is head of the ancient court called the *Board of Green Cloth;* and as such has control of all the officers and servants of the household, except those belonging to the chapel, the chamber, and the stable: to his charge pertain household purveyance and expenditure. The judicial authority of this ancient court long ago fell into disuse, and was abolished early in Queen Victoria's reign. The S. of the H. is always a member of the privy council, and has precedence of all peers of his own degree; receives his charge from the sovereign in person, with a white wand as his badge of office; holds his appointment during pleasure; and his tenure depends on that of his political party: the salary is £2,000.

STEWART, *stū'ert*, ALEXANDER TURNEY: merchant: 1803, Oct. 12—1876, Apr. 10; b. Lisburn, near Belfast, Ireland; of Scotch ancestry. After good education with reference to the ministry, he came to New York 1823, taught a private school, and, returning to Ireland to receive his patrimony, invested it in the best class of Irish textile fabrics, which brought him rich custom when he opened a store in New York 1825. He erected the great marble store, Broadway and Chambers st., which became his wholesale department after he built the iron structure on Broadway, 9th and 10th sts. The latter cost $2,750,000, and the annual sales of the two establishments amounted to $200,000,000. His business made it legally necessary for him to decline Pres. Grant's offer of the U. S. treasury portfolio. He sent as gift a ship-cargo of provisions to relieve the Irish famine 1846; another to France after the Franco-Prussian war; $50,000 to the sufferers of the Chicago fire 1871, and $10,000 to those who suffered from floods in Silesia. Garden City, Long Island, was

founded by him for the sake of his army of employés and others of small means, and he was building a home for working-girls, 4th avenue, 32-33d sts., but since his death it has been converted into a hotel. His palace-home of marble, 5th ave. and 34th st., was replaced in 1902 by a bank building. The fortune left by him was said to be $40,000,000; but neither its amount nor the disposition of it since is publicly known. His body was stolen from its grave to secure ransom; but is generally believed to have been recovered, and interred in the splendid mausoleum at Garden City.—His widow, Cornelia Clinch S., built the superb Cathedral of the Incarnation (Prot. Episc.) at Garden City, and endowed it with an annual income of $15 000.

STEW'ART, Balfour, LL.D., F.R.S.L.: physicist: 1828, Nov. 1—1887, Dec. 21; b. Edinburgh. He was educated at St. Andrews and Edinburgh universities; became director of the Kew Observatory 1859; and was prof. of nat. philosophy in Owens Coll., Manchester, 1870 till his death. S. was discoverer of the law of equality between the absorptive and radiative powers of bodies. Among his published works are: *Researches on Solar Physics; Elementary Treatise on Heat; Elementary Physics; Conservation of Energy.* He wrote numerous papers on meteorology and on magnetism. In conjunction with Prof. Tait he wrote *The Unseen Universe*, a work which made a profound impression, and which went through 12 editions. At his death he was pres. of the London Physical Soc. and of the Soc. for Psychical Research.

STEW'ART, Charles: naval officer: 1778, July 28—1869, Nov. 6; b. Philadelphia; familiarly known as 'Old Ironsides.' He was of Irish descent, became cabin-boy in the merchant marine 1791, and was rapidly promoted; became lieut. in the U. S. navy 1798, was in command of the *Experiment* 1800, and rendered valuable service by capturing privateers. He served with distinction under Preble in the movement against Tripoli 1804, and was one of the officers thanked by congress for their achievements; was again connected with the merchant marine; but on the opening of the war of 1812 re-entered the navy. He commanded the *Constellation*, aided in the defense of Norfolk against a British fleet, afterward commanded the *Constitution*, and took many prizes; received a gold medal, a sword, and a vote of thanks from congress, and other public recognition; was in command of the Mediterranean squadron 1816–20, the Pacific squadron 1820–24, and at various times of the navy-yard at Philadelphia. He became rear-admiral 1862. His service in the navy covered more than 70 years. He died at Bordentown, N. J.—Admiral S. was grandfather of the Irish leader Charles Stewart Parnell.

STEW'ART, DUGALD: eloquent lecturer on the Scottish philosophy: 1753, Nov. 22—1828, June 14; b Edinburgh; son of Matthew S., prof. of mathematics in the Univ. of Edinburgh. After five years at the high school, he entered the univ. in his 13th year, graduating 1769. While S. gave his attention largely to metaphysics, logic, rhetoric, and moral philosophy, he made great attainments also in mathematics, natural philosophy, and classics. In 1771, he studied at Glasgow, through one session, attending the lectures of Dr. Reid, and living in the same house with Archibald Alison (q.v.), and the two became intimate friends. In his 19th year he was called by his father, whose health was failing, to teach the mathematical classes in the Univ. of Edinburgh; 1775, he was elected joint prof., holding that post till 1785. In 1778, in Adam Ferguson's absence on a political mission to America, S. taught the moral philosophy class also. His lectures were wholly his own, and were delivered from notes, as was his practice in after years. At the resignation of Ferguson 1785, he was appointed prof. of moral philosophy, and served actively 25 years. He had a rare gift of didactic oratory, and his lectures were greatly admired and numerously attended. He went over a wide compass of subjects: Psychology, or the Science of Mind proper, Metaphysics, Logic, Ethics, Natural Theology, Principles of Taste, Politics, and last of all, Political Economy, which, from 1800, he treated in a separate course. In 1792, appeared vol. I. of his *Elements of the Philosophy of the Human Mind.* In 1793, he published his *Outlines.* He read before the Royal Soc. of Edinburgh 1793, his *Account of the Life and Writings of Adam Smith;* in 1796, *Account of the Life and Witings of Principal Robertson;* and 1802, *Account of the Life and Writings of Dr. Reid.* In 1805 he was prominent in the Leslie controversy; setting forth the facts in a pamphlet; also, in the gen. assembly, giving vent to his indignation at the proceedings against Leslie (see LESLIE, Sir JOHN). In 1806, on the accession of the whig party to power, he received a sinecure office worth £300 a year. The death of his second son, 1809, gave a blow to his health, and he was unable to lecture during part of the following session; Dr. Thomas Brown (q.v.) at his request acting as his substitute: the following year, Brown was appointed conjoint prof., and taught the class till his death 1820. From 1809, S. lived in comparative retirement at Kinneil House, Linlithgowshire, which the Duke of Hamilton placed at his service. In 1810, he published *Philosophical Essays;* 1814, vol. II. of the *Elements;* 1815, the first part, and 1821, the second part of the *Dissertation on the History of Ethical Philosophy;* 1827, vol. III. of the *Elements;* and 1828, a few weeks before his death, *Philosophy of the Active and Moral Powers.*

On the death of Brown, S. retired altogether from the professorship, and was succeeded by John Wilson ('Christopher North').

The philosophy of S. was but the continuance of the reaction begun by Reid (see REID, THOMAS) against the

skeptical results that Berkeley and Hume drew from the principles of Locke. Both Reid and Stewart professed the Baconian method of observation and induction as against mere ontology, but considered that these processes of investigation could establish certain ultimate truths of a higher certainty than themselves. Hence arose the principles of common sense of Reid, in which Stewart for the most part acquiesced (see COMMON SENSE, THE PHILOSOPHY OF). Stewart also followed and improved upon Reid in that systematic exposition of all the powers of the mind which had rendered mental philosophy for the first time a subject of study, independent of metaphysical, logical, and ethical applications; though he also followed it out in all these directions with his usual felicity of exposition. His contributions to the philosophy of Taste, in the *Philosophical Essays,* are among the best of his writings.

On the whole, though Stewart was not one of the original thinkers of his department, yet, by the impressive eloquence and the moral elevation of his teaching and the compass of his writings, he did much to diffuse an interest in speculations concerning the human mind.

STEWART, GEORGE: Canadian author: b. New York 1848. He was brought to London, Ont., three years later, living there until 1859, when his family removed to St. John, N. B. After training as a chemist he finally went into journalism and founded *Stewart's Literary Quarterly* 1867. The publication ceased in 1872, when he edited the *Canadian Monthly* and contributed to many magazines, encyclopedias, etc. His works include: *Story of the Great Fire in St. John* (1877); *Evenings in the Library* (1878); *Canada Under the Administration of the Earl of Dufferin* (1878); *Emerson the Thinker* (1879); *Alcott, the Concord Mystic* (1880); *Essays from Reviews* (1892-3).

STEW'ART, HAMILTON: pioneer: b. Ky., 1813. He removed to Texas, and 1838 established the *Civilian,* a democratic newspaper, which he edited for a long period. He was prominent in the political affairs of Texas, was repeatedly elected mayor of Galveston, which city he represented 1856 in the constitutional convention; strongly preferred independence to admission to the Union; but in the early years of the secession agitation threw his influence against secession. He was collector of the port of Galveston in the administrations of President Pierce and President Buchanan, and for many years was on the editorial staff of the Galveston *News.*

STEW'ART, JOHN: revolutionary soldier: b. Ireland; brother-in-law of Gen. Wayne. He emigrated to the American colonies, and entered the army, where he was given command of a corps of light infantry. For bravery at the storming of Stony Point 1779, July 15, congress voted him a gold medal. He died near Charleston, S. C.

STEWARTRY, *stū'ert-rĭ,* in Scotland: district governed by a steward, an officer appointed by the king with jurisdiction over crown-lands, and powers similar to those of a lord of regality—having the civil jurisdiction of a sheriff, with a criminal jurisdiction much more extensive. The only remaining trace of this jurisdiction is the term S. applied instead of county to the district of Kirkcudbright. See GALLOWAY.

STEYR, or STEIER, or STEYER, *stī'ĕr:* town of Upper Austria, on an island at the confluence of the Steyr and the Enns, 23 m. s.e. of Linz, 92 m. w.s.w. of Vienna. It is a great seat of the iron and steel manufactures of Austria, and has important manufactures of paper, woolens, and hosiery. Its small-arms factory is the largest in Austria. Near the town is the castle of the princes of Lamberg, dating from the 10th c. S., formerly belonging to Styria, has been Austrian since 1192.—Pop. (1900) 17,592.

STHAVIRA [Skr., old]: in Buddhist hierarchy, the 'elders' or 'venerables,' who, after the death of *the* Buddha S'âkyamuni, taught the doctrine, presided at the Buddhist assemblies, etc., and, since the time of As'oka, were invested with a kind of episcopal power. In the sectarian history of Buddhism, S. is the name of those Arhats who did not follow the schism of the Mahâsânghikas (q.v.). There are also other accounts of it.—See C. F. Koeppen, *Die Religion des Buddha* (Berlin 1857); W. Wassiljew, *Der Buddhismus, seine Dogmen, Geschichte, und Literatur* (St. Petersburg 1860).

STHENIC, a. *sthĕn'ĭk* [Gr. *sthenos,* strength]: in *med.,* attended with a morbid increase of vital action—applied to diseases; opposed to *asthenic,* or diseases of debility.

STIBIAL, a. *stĭb'ĭ-ăl* [L. *stibium;* Gr. *stimmi,* antimony]: having the qualities of antimony; antimonial. STIB'IATED, a. *-ā-tĕd,* impregnated with antimony. STIB'NITE, n. *-nīt,* sulphide of antimony; the principal ore of antimony, occurring in very long prismatic or acicular crystals, or in a fibrous form—this ore has been in use among oriental nations from a very remote period for staining the eyelids—also called ANTIMONITE. STIB'IUM, n. *-ĭ-ŭm,* antimony; stibnite.

STICH, n. *stĭk* [Gr. *stichos,* a row, verse]: a verse or line in poetry; a line from the Scriptures; a row of trees. STICHOMANCY, n. *stĭk'ō-măn'sĭ* [Gr. *manteïa,* divination]: divination from the assumed meaning of a line or verse, taken at hazard, as from Scripture. STICHOMETRY, n. *stĭk-ŏm'ĕ-trĭ* [Gr. *metron,* a measure]: a catalogue of the books of Scripture, with the number of verses each one contains.

STICHIDIA, n. plu. *stĭk-ĭd'ĭ-ă* [Gr. *stichos,* a line; *eidos,* appearance]: in *bot.,* lance-shaped receptacles for the spores of some algæ.

STICHO-, prefix, *stĭk-o:* having rod-like processes.

STICK, n. *stĭk* [AS. *sticca;* Icel. *stika,* a stick: Dut. *steken;* Ger. *stecken*, to stick into, to come to a stand: Icel. *stika*, to drive piles: Dan. *stikke*, to prick, to stab]: a long, small piece of wood; a stem or branch of a tree cut for fuel; a rod; a stab; a thrust or sharp blow with a pointed instr.; in *common usage*, a poor preacher or speaker: V. to pierce; to stab, as animals; to fix in or on; to hold or cleave to; to adhere closely; to remain, as in the memory; to be hindered from proceeding; to set with something pointed; to be constant or firm; to resist efforts to remove; to scruple; to hesitate. STICK'ING, imp.: ADJ. adhering: N. act of one who or that which sticks. STUCK, pt. pp. *stŭk*, hindered from proceeding; fixed in. STICKY, a. *stĭk'ĭ*, having the quality of adhering to a surface; gluey. STICK'INESS, n. *-nĕs*, the quality of being sticky; adhesiveness; tenacity. STICK-LAC, lac in its natural state. TO STICK AT, to hesitate. TO STICK BY, to adhere closely; to be firm in supporting. TO STICK OUT, to project; to be prominent; to refuse compliance. TO STICK TO, to adhere closely. CUT YOUR STICK, make your mark on the tally or stick and pass on; be off instantly: see NICK.

STICKING-PLASTER, or COURT-PLASTER: adhesive plaster for closing wounds or for covering an injured part. It is prepared in the following manner: Two solutions are made, one of an ounce of isinglass in eight ounces of hot water, the other of two drachms of gum-benzoin in two ounces of rectified spirit: these solutions are strained and mixed. Several coats of this mixture, kept fluid by gentle heat, are applied with a camel's-hair brush to a piece of black silk stretched on a frame, each coat being allowed to dry. A layer of a solution of one ounce of Chian turpentine in two ounces of tincture of benzoin, is then applied to the other side of the silk, and allowed to dry. Instead of the black S. P., colorless plaster, or *Gold-beater's Skin* (q.v.), is often preferred.

STICKLE, v. *stĭk'l* [OE. *sticklers*, persons appointed to see that the parties in a combat had fair-play; proper form *stightlers*—from AS. *stihtian*, to govern, to dispose]: to take part with a side; to contend; to wrangle; to go from side to side. STICK'LING, imp. *-lĭng*. STICK'LED, pp. *stĭk'ld*. STICK'LER, n. *-lĕr*, one who obstinately contends about a thing. TO STICKLE FOR, to maintain one's rights.

STICKLEBACK, n. *stĭk'l-băk* [AS. *sticel*, a prickle, and Eng. *back*]: fish, of various genera and species of the family *Gasterosteidæ*, in which the first dorsal fin is represented by a number of detached spines, a single strong spine occupies the place of the ventral fins, there are only three branchiostegal rays, the gill-covers are not armed, and the body is mailed by plates on the lateral line, and destitute of scales. Some of the characters are so different from those of *Teleocephali*, that the family, with several others, has been made an order or sub-order, *Hemibranchii*. The species are found in fresh and brackish waters, and in the sea, in cold and temperate regions; and are small fishes, interesting from their habits and the beauty of their

colors, which they change remarkably, partly according to the colors of surrounding objects, partly through the influence of their own passions. A species having three spines instead of the first dorsal, is extremely abundant in rivers, ponds, and brackish waters in most parts of Europe, and is sometimes found in the sea. A marine species, with 14–15 spines, is common on the n. coasts of Europe. *Gasterosteus biculeatus*, with 2 spines, is found n. of New York, and is 2 in. long and of greenish color; also a four-spined species. Sticklebacks caught in a river readily accommodate themselves to a salt-water aquarium. The S. seldom exceeds two inches and a half, or three inches in length. The common fresh-water species are seldom used as food, yet they are said to be excellent for this purpose. Oil has sometimes been expressed from them. In the aquarium, or in their native waters their combats are very amusing. They are excessively pugnacious, particularly at the breeding season, when each male S. appropriates a certain territory which he holds fiercely against all intruders, and into which he introduces the females. The larger often devour the smaller, and they destroy the fry of fishes to a prodigious extent; they feed also on aquatic larvæ, and are probably of great use in preventing the excessive multiplication of many kinds of insects. A small S. in an aquarium devoured in five hours 74 newly-hatched dace about a quarter of an inch long. Their nest-building, which is particularly interesting, was the first observed among fishes. They collect small pieces of straw or stick, with which the bottom of the nest is laid among water-plants, and these they cement together by an exudation from their own bodies, which forms a thread through and round them in every conceivable direction. The thread is whitish, fine, and silken. The sides of the nest are made after the bottom. The nest of the Fresh-water S. is about the size of a small hazel-nut: the eggs, about the size of poppy-seeds, are deposited within. The male makes the nest, into which he introduces the female for laying the eggs, and he afterward watches it with great care—necessary because the eggs are acceptable food to any other stickleback.

STICKY: see under STICK.

STIFF, a. *stĭf* [Ger. *steif;* Dan. *stiv;* Dut. *stijf;* Sw. *styf*, stiff: L. *stipāre*, to pack close]: not easily bent; not pliant; rigid; rather hard than soft; strong; not giving way; stubborn; firm in perseverance or resistance; not natural and easy, as manners; affected; constrained; not written with ease; formal; impetuous in motion, as a breeze. STIFF'LY, ad. *-lĭ*, rigidly; inflexibly; strongly. STIFF'NESS, n. *-nĕs*, the state of being stiff; want of flexibility; stubbornness; the state of being harsh and constrained. STIFF-HEARTED, a. obstinate; stubborn. STIFF-NECKED, a. stubborn; inflexibly obstinate. STIFFEN, v. *stĭf'n*, to make stiff; to become stiff; to grow hard; to become less susceptible of impressions. STIFFENING, imp. *stĭf'nĭng:* ADJ. becoming or growing stiff: N. something used to make a substance more stiff. STIFFENED, pp. *stĭf'nd*. STIFFENER.

n. *stĭf'nĕr,* that which stiffens. STIFF'ISH, a. *-ĭsh,* somewhat stiff.—SYN. of 'Stiff': rigid; inflexible; strong; hardy; obstinate; pertinacious; harsh; starched; rigorous;—of 'stiffness': rigidity; tension; contumaciousness; constraint.

STIFF-NECK, or WRY-NECK, or TORTICOLLIS: condition of the neck in which rotation of the head causes great pain, and which is due to rheumatism of the muscles on the side of the neck, especially the sternomastoid. The condition may be either temporary or permanent: in the latter case the surgeon may have to divide the contracted muscles But usually it is only a temporary affection. In the great majority of cases, only one side of the neck is affected, the head being drawn more or less obliquely toward that side; but occasionally both sides are equally attacked, in which case the head is held stiffly erect and looking straight forward. As long as the head remains at rest, there is merely discomfort; but every movement is extremely painful. In addition to the ordinary treatment of sub-acute Rheumatism, application of heat will often be advantageous.

STIFLE, v. *stī'fl* [Icel. *stifla,* to stop, to dam: Norw. *stivla,* to check: Dan. *stive,* to stiffen (see STIFF)]: to stop the breath; to suffocate; to choke; to smother; to conceal; to suppress; to hinder from spreading, as a report. STI'FLING, imp. *-flĭng:* ADJ. causing a feeling of suffocation. STIFLED, pp. *stī'fld,* suppressed; suffocated.

STIGMA, n. *stĭg'mă,* plu. STIG'MAS, *-măz,* or STIG'MATA, *-mă-tă* [L. and Gr. *stigma,* a mark made with a sharp-pointed instr.—from Gr. *stizō,* I mark with points]: anything which tarnishes character or reputation; a mark made with a red-hot iron; a brand impressed on slaves and others; a small red speck on the human skin, causing no elevation of the cuticle; any mark of infamy; in *bot.,* the receptive upper portion of the pistil on which the fertilizing pollen falls (see PISTIL). STIG'MATA, n. plu. the spiracles or breathing-pores of insects: the marks of the wounds on Christ's body, or marks resembling them, a term borrowed from Gal. vi. 17, 'I bear in my body the marks (Greek and Vulgate, *stigmata*) of the Lord Jesus' (see STIGMATIZATION). STIGMATIC, a. *stĭg-măt'ĭk,* or STIGMAT'ICAL, a. *-ĭ-kăl,* branded or marked with a stigma. STIGMATIC, n. in *OE.,* one who has a natural deformity. STIGMATICAL, a. in *OE.,* pertaining to one with a natural deformity. STIGMAT'ICALLY, ad. *-lĭ,* in the way of a stigma; in *OE.,* with a mark of infamy or deformity. STIGMATIZE, v. *stĭg'mă-tīz,* to set a mark of disgrace on; to denounce as infamous. STIG'MATIZING, imp. STIG'MATIZED, pp. *-tīzd,* marked with disgrace (also, see STIGMATIZATION). STIGMARIA, n. *stĭg-mā'rĭ-ă,* in *geol.,* root-stems peculiar to the carboniferous system, so named from their regular pitted or dotted surfaces: see SIGILLARIA.

STIGMATIZA'TION [Lat. *stigmatizatio*, a branding, puncturing—from Gr. *stigma*, puncture, brand]: name applied, by the mystic writers of the Rom. Cath. Church, to the supposed miraculous impression on certain individuals of the 'stigmata,' or marks of the wounds which Christ suffered during his Passion: to these the apostle Paul is by some supposed to allude (Gal. vi. 17): 'I bear branded on my body the marks (Gr. *stigmata*) of Jesus.' These stigmata comprise not only the wounds on the hands and feet, and that on the side, received in the crucifixion, but also those impressed by the crown of thorns and by the scourging. The impression of the stigmata, being held to be miraculous, was regarded as a mark of the signal favor of Christ, manifested to those especially devoted to the contemplation of his Passion. The most remarkable example of S. is referred to in the memoir of FRANCIS OF ASSISI (q.v.), and is said to have occurred on the mountain of Alverno, 1224, Sep. 14, two years before the death of Francis. (But Francis was not the first *stigmatizatus*, for a church council at Oxford, 1222, condemned an impostor who pretended that his body bore the miraculous stigmata.) Being absorbed, according to the account of his biographers, in profound and rapturous contemplation of the Passion of Christ (the day being the feast of the Exaltation of the Cross), he saw, as it were, a seraph with six shining wings, blazing with fire, having between his wings the figure of a man crucified, descend from heaven, and approach him, so as to be almost in contact. After a time, the vision disappeared, but left the soul of Francis filled with reverence and awe; and on his return to calmer thought, he became aware that his body had received externally the marks of the crucifixion. His hands and feet seemed bored through with four wounds, and these wounds appeared filled with nails of hard flesh, whose heads protruded and appeared on the palms of his hands, and on the instep, while the points protruded on the opposite side, and seemed as if clinched with a hammer. His side, moreover, presented a red wound, as though from the point of a lance, and this wound occasionally gave forth blood. These mysterious marks continued, and, it is recorded, were frequently seen by St. Bonaventure, by Pope Alexander IV., and by others during the two years from this date to the death of Francis; and they were seen by multitudes after his death.

This is not the place for discussion of the origin or the nature of this phenomenon; but it may be remarked that analogous effects are believed by mesmerists to be produced in somnambules under the influence of animal magnetism; see J. Ochorowicz, *Mental Suggestion* (New York 1891). The case of Francis of Assisi is not solitary in ecclesiastical history: very many others are recorded as having received all or some of the stigmata. The cases of women are more numerous than of men. A very remarkable one is that of Veronica Giuliani 1694, who is related to have received first the marks of the crown of thorns, and afterward those of the crucifixion: Gabriella da Pie-

zolo of Aquila is recorded to have received the mark of the lance 1472; Clara di Pugny, tertiary of the Dominican order, was similarly impressed 1514; and Cecilia di Nobili of Nocera 1655. Catherine di Raconisio is alleged to have been marked with the crown of thorns 1583; likewise several others, e.g., Maria Razzi of the island of Chio; Maria Villani, Vincenza Ferreri of Valencia; and Joanna Maria of the Cross, a nun of St. Clare, at Roveredo. In some cases, the visitation, though said to be accompanied with excruciating pain in the seat of the several wounds, was unattended by any external marks: such was the case of St. Catherine of Siena (d. 1380), of Ursula Aguirre—otherwise known as Ursula of Valencia—of Mary Magdalen di Pazzi, and of Mechtildis von Stanz: in other cases the wounds were in part visible, in part invisible. Thus, Hieronyma Carvaglio suffered the pain of the wounded hands and feet without any external mark, while the lance-wound was not only visible in her side, but was reported to bleed every Friday, the day specially devoted to the commemoration of the Passion. Blanca de Gazeran experienced the sensation of pain in the seat of each one of the wounds, but the mark of the nail was visible on the right foot only. Similar variety of sensation is recorded in other cases.

In a monograph on the subject (*Les Stigmatisés*, pub. 1873), Imbert-Bourbeyre enumerates 145 persons branded with the stigmata; of these 20 are men, the rest women. Of the 145, 80 lived before the 17th c. There have been several cases of S. in the 19th c.—the most famous in recent times that of Louise Lateau, on whom the stigmata appeared 1868, Apr. 24: her case was investigated by Prof. Lefebvre of Louvain, for 15 years physician to two lunatic asylums: she had a periodic bleeding of the stigmata every Friday, and the hystero-cataleptic condition often recurred. A Prot. young woman of Saxony was marked with the stigmata 1820.—The great repertory for this and like phenomena is Görres's celebrated work, *Christliche Mystik:* for critical study of S. as a pathological phenomenon, see Berjon's *La Grande Hystérie chez l'Homme;* Beaunis's *Recherches sur l'Activité cérébrale.*

STILAGINACEÆ, *stīl-ăj-ĭn-ā'sē-ē:* natural order of exogenous plants, allied to *Urticeæ*, containing about 20 known species of trees and shrubs, natives of the E. Indies, Mauritius, and Madagascar: none are important.

STILBITE, n. *stĭl'bīt* [Gr. *stilbō*, I shine]: a hydrous silicate of alumina and lime, occurring in broad pyramidal crystals, varying in color, found most frequently in traps and amygdaloids (see ZEOLITE). STILBENE, n. *stĭl'bēn*, a hydrocarbon of the aromatic series.

STILE, n. *stīl* [AS. *stigel*, a step—from *stigan*, to climb: Low Ger. *stegel*, steps in a wall for getting over]: a series of rude steps for getting over a wall or fence.

STILE, n. *stīl* [see STYLE]: the pin on the face of a dial required to project a shadow. STILAR, a. *stī'lĕr*, pertaining to the stile of a dial.

STILES, *stīlz*, EZRA, D.D., LL.D.: 1727, Dec. 10—1795, May 12; b. North Haven, Conn.: Congl. minister, and pres. of Yale Coll. After graduation at Yale 1746, he was tutor there 1749–55, and, while so employed, 'performed the first electrical experiments ever made in New England;' also studied theology, and preached. Turning to law, he practiced in New Haven 1753–55, giving a Latin oration in honor of Benjamin Franklin's visit to that city 1755. Resuming ministerial work, he was Congl. pastor at Newport, R. I., 1756–77. The war dispersing his congregation, he was pastor of the North Church, Portsmouth, N. H., until 1778, when he entered on the presidency of Yale, having been elected the previous year, and continued in the office until his death, and in that office teaching eccl. hist. and theol., and giving weekly scientific lectures. He was a man of great assiduity and extensive learning. Besides sermons and several Latin orations, he pub. *Account of the Settlement of Bristol* (1785), and *History of Three of the Judges of Charles I.* (1795).

STILETTO, n. *stĭ-lĕt'tō* [It. *stiletto*—from *stilo*, a dagger—from L. *stilus*, a pointed instr. for pruning or writing]: a dagger with a round-pointed blade; a pointed instr. for piercing holes: V. to stab with a stiletto. STILET'TOING, imp. STILET'TOED, pp. *-tōd*.

STILICHO, *stĭl'ĭ-kō*, FLAVIUS: celebrated Roman general and statesman, mainstay of the Western Empire after the death of Theodosius (q.v.) the Great: about 359–408, Aug. 23; of Vandal origin, son of a capt. of barbarian auxiliaries in the imperial army. He rose through his military talent to high rank in the army, and Emperor Theodosius sent him as ambassador to Persia, and on his return from the successful mission gave him his niece Serena in marriage. S.'s promotion aroused the jealousy of Rufinus, the able but evil-minded and ambitious minister of Theodosius, and caused an inextinguishable feud between the two. In 394, S. departed for Rome in charge of the youthful Honorius (q.v.), placed him on the throne of the Western Empire, and administered in his name the affairs of state On the death of Theodosius, toward the close of 394, the quarrel for supremacy between S. and Rufinus, the guardian of Arcadius (q.v.), became fully developed, and Alaric (q.v.), at the instigation of the latter, invaded Greece while S. was chastising the invaders of the Roman territories on the Rhine and in Gaul. S. returning, set out for Constantinople, and ended the struggle between himself and Rufinus by the destruction of his rival 395. He then marched against Alaric, blocked him up in the Peloponnesus, but, through over confidence, permitted him to escape across the isthmus with his captives and booty. In 398, his daughter Maria became the wife of Honorius. His old opponent, Alaric, after several inroads on the e. provinces of the Western Empire, invaded n. Italy, but was signally defeated at Pollentia (403, Mar.) by S., who had hurriedly called in the Roman legions from Rhætia, Gaul, Germany, and even Britain. Alaric was

again defeated at Verona, and retired from the empire; and S. obtained the honor of a triumph at Rome, with great increase of influence and power. S.'s ambition now led him to attempt the introduction of his own family to the imperial succession (a statement disbelieved by Gibbon, who considers it an invention of the crafty Olympius; though the great historian of the Roman Empire honestly confesses to various heavy blots on the character of his hero), by the marriage of his son with the heir-presumptive Placidia, daughter of Theodosius; and to attain this end, he made overtures of alliance to Alaric, which were gladly accepted. But the dreadful inroad of Radagaisus, 406, at the head of more than 200,000 (some say 400,000) barbarians, who ravaged the whole country as far as Florence, compelled the great general of the West to lay aside for a time his ambitious schemes. With a small but chosen army of veterans, aided by a body of Huns under Uldin (father of Attila), and of Visigoths under Sarus, he so harassed the invaders, that they were forced to give him battle. They were soon routed. Radagaisus, who surrendered, was put to death, and his followers were sold as slaves. S. resumed his pet scheme; established enmity between Rome and Byzantium by seizing on Eastern Illyricum and inducing Alaric to transfer his allegiance to Honorius. But Honorius, who had been prejudiced against S. by one of his officers, Olympius (see Gibbon's view above) refused to take E. Illyricum from the Byzantine Empire; and subsequently, by an artful harangue, he so influenced the soldiers of the army of Gaul, that they rose *en masse* against the partisans of Stilicho. S. himself was at Bologna; and on the news of the *émeute*, his most zealous friends urged immediate action against Olympius and the Pavian rebels; but for the first time in his life, vacillation (due as some think to his loyalty), seized S., and he declined. His party then, for self-preservation, turned against him; and one of them, Sarus, the Goth above mentioned, drove him out of his camp, and compelled him to flee to Ravenna, where he was soon afterward induced by false promises to surrender himself, and was beheaded. Thus perished S.—the last of the series of distinguished aliens, who, as emperors, warriors, or statesmen, had propped up the Roman Empire for 150 years, with a stern and resolute zeal equal to that of the early Romans themselves—after he had protected the weak empire from formidable invasion by his own kinsmen, administered its affairs with remarkable ability, moderation, and integrity, and restored the old heroic glory to the imperial arms. Three months after his death, Alaric and his Visigoths were at the gate of Rome.

STILL, a. *stĭl* [Ger. *still*, still: Dan. *stille;* Sw. *stilla;* Dut. *stil*, calm]: without sound; noiseless; quiet; silent; uttering no noise; motionless; in *OE.*, continual; constant: N. silence; calm: Ad. to this time; always; continually; after that; even yet: V. to make motionless; to put a stop to, as noise, motion, etc.; to calm; to lull; to silence. Still'ing, imp. Stilled, pp. *stĭld.* Still'ness, n. *-nĕs*, freedom from noise; in *OE.*, habitual silence; taciturnity.

STIL'LY, a. *-lĭ*, quiet; calm: AD. silently. STILL-BORN, a. dead at birth; abortive. SYN. of 'still, v.': to quiet; calm; pacify; appease; subdue; suppress; stop; check; restrain;—of 'still, a.': quiet; gentle; serene; inert; stagnant;—of 'still, ad.': nevertheless; notwithstanding; ever.

STILL, n. *stĭl* [L. *stillārĕ*, to drop—from *stilla*, a drop]: vessel or apparatus for distilling liquids: V. to distil. STILL-ROOM, apartment for distilling; room where liquors, preserves, and the like are kept.—A *still* consists of the copper boiler or *alembic* (see DISTILLATION), in which is the fermented liquor whose vapors are to be distilled; of the *neck* or *head*, a pipe which conveys the vapor generated in the boiler into the worm; and of the *worm*, a coiled metal tube, packed in a vessel called a *refrigeratory* fitted up in such a manner that the cold water which is poured in at the top comes in contact as extensively as possible with the outside of the tube and exercises a condensing action on the vapor which it contains. The vapor thus condensed in its passage through the worm, makes its exit in drops, or in a small stream, into a vessel called the *recipient*, and may be redistilled or not as required. The forms of stills are extremely numerous, almost each species of spirit having a form fitted to it; but all conform to the general description above.

STILLÉ, *stĭl'lā*, CHARLES JANEWAY, LL.D.: historian: b. Philadelphia 1819, Sep. 23; d. 1899, Aug. 11. He graduated at Yale 1839, and was admitted to the bar. He was a member of the executive committee of the U. S. sanitary commission from its establishment in the beginning of the war of secession. He became professor of history in the University of Pennsylvania 1866, and was provost of that university 1868-80. He published *Historical Development of American Civilization; History of the United States Sanitary Commission* (1866); *Studies in Mediæval History* (1882); *Beaumarchais and the Lost Milton* (1886); etc.

STILLINGFLEET, *stĭl'ĭng-flēt*, EDWARD: bishop of Worcester: 1635, Apr. 17—1699, Mar. 28; b. Cranbourne, Dorsetshire, England. He attended the grammar school of his native place; and 1648 became a student at St. John's College, Cambridge; took his degree as master of arts; and 1653 obtained a fellowship. For some years he was a private family tutor; and 1657 was presented to the rectory of Sutton. In 1659, he published *Irenicum*, or *the Divine Right of Particular Forms of Church Government examined*, maintaining views more latitudinarian than could be pleasant to the high church party, which views he afterward saw reason to modify. His next book was *Origines Sacræ, or Rational Account of the Christian Faith, as to the Truth and Divine Authority of the Scriptures:* this

made his reputation, and is still esteemed as one of the masterly treatises on its subject. In 1664, appeared his *Rational Account of the Grounds of the Protestant Religion*, a defense of the Church of England from the charge of schism in its separation from Rome, which was received with great favor, and brought him preferment. In 1665, the Earl of Southampton presented him to the rectory of St. Andrews, Holborn; he was also appointed preacher at the Rolls Chapel, and lecturer at the Temple, and chaplain in ordinary to Charles II. In 1670, he became, by favor of the king, canon residentiary of St. Paul's Cathedral, and 1678, was made dean of the same. In the court of ecclesiastical commission, instituted by James II., S. declined to act; and after the revolution of 1688, he received, in final acknowledgement of his services to the Protestant cause, his appointment to the bishopric of Worcester. He died at Westminster, and was buried in Worcester Cathedral.

S.'s chief works, besides the above, were *Origines Britannicæ, or Antiquities of the British Churches;* and a bulky volume, *The Unreasonableness of Separation*, in reply to an attack from Howe and others. Throughout, he was almost constantly producing polemic treatises, on one hand against the adherents of the Church of Rome, and on the other against the Nonconformists. His collected works, 6 vols. folio, were pub. 1710; and 1735 a supplementary vol. of Miscellanies was issued by his son, the Rev. James S., Canon of Worcester. S., though keen and unsparing in conflict, yet by his unquestioned piety and honesty of intention commanded the respect even of his bitter opponents.

STILLING THE SEA: see OIL ON THE WAVES.

STILLMAN, *stĭl'man*, SAMUEL, D.D.: 1737, Feb. 27—1807, Mar. 12; b. Philadelphia: Bapt. minister. His family removing to Charleston, S. C., he was there educated, studied theol., and was ordained an evangelist. After service at Bordentown, N. J., 1761–63, he was pastor of the First Bapt. Church in Boston till his death, with high reputation for pulpit eloquence. In public affairs, such as schools and benevolent institutions, he was active; was a founder of Brown Univ. 1764; and member of the convention that devised the U. S. constitution 1787. Some of his many sermons and addresses were pub. in a vol. 1808.

STILL'WATER: city, cap. of Washington co., Minn.; on Lake St. Croix, and on the Chicago Milwaukee and St. Paul, the St. Paul and Duluth, the Chicago St. Paul Minneapolis and Omaha, and the Chicago and Northwestern railroads; 18 m. e.n.e. of St. Paul, 25 m. e. of the Mississippi river. It is at the head of navigation of St. Croix river, which here broadens into a beautiful lake; and it has lumber interests in which more than $3,000,000 capital is invested. It contains 18 churches, pub. libraries, substantial co. and municipal buildings, penitentiary, 14 public-school buildings, school property valued at $179,500, 2

national banks (cap. $350,000) 2 savings banks, and 1 daily and 4 weekly publications. The principal trade is in lumber; other industries are iron-foundries and flour-mills. Pop. (1900) 12,318; (1910) 10,198.

STILT, n. *stilt* [Ger. *stelze;* Dan. *stylte;* Norw. *styltra;* Sw. *stylta;* Dut. *stelt*, a stilt]: a pole of wood with a support or shoulder to raise the foot above the ground in walking, used in pairs: in *Scot.*, a crutch: V. to raise as on stilts; to raise by unnatural means. STILT'ING, imp. STILT'ED, pp.: ADJ. elevated as on stilts; pompous; bombastic; inflated. STILT, or STILT-BIRD (see STILT 2). STILTS, n. plu. the parts of the plow forming the two handles to be held by the plowman when plowing. STILTED ARCH, arch in which the impost molding is placed some distance below the springing of the arch.

Stilted Arch.

STILT, miscalled STILT PLOVER (*Himantopus*): bird of the Avocet family (*Recurvirostridæ*), of few species, including the White S. of the central belt of the old world, with back and wings greenish black. The U. S. species is *H. nigricollis*, 13–15 in. long, black glossed with green, with forehead, sides of the neck, rump, and under parts white; back also white, but so concealed by the scapular feathers as to appear black; slender bill, slightly recurved, 3 in. long; legs pale carmine-red and very long. It is known also as Longshanks, and Lawyer. The young and females have brown instead of black. The species reaches the coast of N. J. from the s. the last of Apr. in small flocks, and breeds in salt-marshes. The nests are slightly constructed at first, but, as common with marsh-birds, built higher and stronger during incubation. On alarm, the parent birds alight at a distance, and simulate weakness to invite pursuit away from the nest. They feed on the smaller aquatic animals, and their flesh is not much esteemed.—The STILT SANDPIPER (*Micropalama himantopus*), or Long-legged Sandpiper, 8–9 in. in length, bill $1\frac{1}{2}$–$1\frac{2}{3}$, is of family *Scolopacidæ*, and resembles in coloring the Red-breasted or Gray Snipe, but the tail quills are not barred: it is found in N. Amer. generally, but not common anywhere.

STILTON, n. *stil'tŭn:* a white rich cheese first made at *Stilton* in Huntingdonshire, now made in Leicestershire, etc.

STIM'ULANTS: agents which suddenly but not permanently augment the activity of the vital functions. They give increased energy to the circulatory and cerebro-spinal nervous systems, the primary effect being probably on the nervous system, while the circulation is only secondarily affected. In their mode of action they resemble Tonics (q.v.) in some respects: thus immediately after their administration a feeling of increased power is produced, which, however, is not permanent, and is almost always followed by corresponding depression of vital power; their effects are, however, more immediate than those of tonics.

STIMULANTS.

Many of these agents, e.g., alcohol and the ethers, are closely allied to narcotics, their secondary effect, if given in sufficiently large doses, being to produce sleep, and even coma.—The following are the most important of the general stimulants. 1. *Alcohol,* in the various forms of spirits and wines. As a stimulant, alcohol is used in medicine to spur the vital powers in the advanced stages of fevers, particularly those of low or typhous character. In anæmia or poverty of the blood, wine may be temporarily useful at meals on account of its stimulating the appetite. Alcohol aggravates rheumatic and gouty affections. In all cases, it is but a whip or spur, to be used only in emergencies when other means are wanting, and with full knowledge that the reaction depresses the vital energies. (Further, see ALCOHOL.—*Uses:* and references there given.) 2. *Ammonia,* either in the form of *Solution of Ammonia,* or *Liquor Ammoniæ,* or as *Carbonate of Ammonia,* is a general stimulant, whose action is rapid, but temporary. It is of special use in the advanced stages of continued fever, in the eruptive fevers when the rash has receded (especially in scarlatina), and in later stages of pneumonia. It is the best internal stimulant to employ in profound intoxication, and in cases of poisoning by sedatives; and as an external stimulant, the vapor is cautiously inhaled in cases of fainting. The solution, or water of ammonia, may be given in doses of 5 to 30 minims, diluted with two ounces of water, mucilage, or any bland fluid. The *Carbonate* may be given in doses of 3 to 10 grains in pills or in cold water. The *Aromatic Spirit of Ammonia,* containing both ammonia and its carbonate, is an excellent and agreeable stimulant in fainting, hysteria, flatulent colic, etc., in doses of half a dram to a dram, taken in water, etc. 3. *Cajeput Oil,* in doses of 2 to 6 drops on a lump of sugar, or rubbed up with sugar, is a powerful diffusible stimulant, admirably suited for cases of flatulent distention of the stomach and intestines. 4. *Ether* acts as a general diffusible stimulant; but its effects, though rapid, are very transient. It is employed chiefly as a stimulant in spasmodic and nervous affections unaccompanied by inflammation, e.g., in cramp of the stomach, in spasmodic or flatulent colic, in nervous palpitations, in hiccup, in nervous headache, during a paroxysm of spasmodic asthma, etc. It frequently has good effect in advanced stages of fever, when the twitching of the muscles, known as *subsultus tendinum,* and hiccup are present; and as an immediate stimulant in fainting and asphyxia. The usual dose is about a dram in some aromatic water. To these more important stimulants may be added camphor, ginger, horse-radish, the preparations of lavender, of the mints, etc.

STIMULATE, v. *stĭm'ū-lāt* [L. *stimŭlātus,* pricked with anything sharp, urged onward; *stimulārĕ,* to prick —from *stimŭlus,* a goad: F. *stimuler*]: to excite action, or more vigorous exertion; to urge; to animate. STIM'ULATING, imp. STIM'ULATED, pp. STIM'ULANT, n. *-lănt* [F. *stimulant*—from L. *stim'ŭlans* or *stimŭlan'tem,* impelling, driving]: in *med.,* anything which produces a sudden though transient increase of vital energy and strength: ADJ. having the quality of increasing or exciting vital action. STIM'ULANTS, n. plu. *-lănts,* familiarly, intoxicating liquors: in *med.* (see below). STIM'ULATOR, n. *-tėr,* one who stimulates. STIM'ULA'TION, n. *lā'shŭn,* act of stimulating or exciting; the effect produced. STIM'ULATIVE, a. *-lā-tĭv,* exciting to action: N. that which excites or rouses to action. STIM'ULOSE, a. *-lōz,* in *bot.,* covered with stings. STIM'ULUS, n. *-lŭs* [L. *stimŭlus,* a goad]: in *med.,* that which produces a sudden but transitory increase of vital action (see STIMULANTS): anything that excites to action; in *bot.,* a stinging hair.—SYN. of 'stimulate': to incite; encourage; impel; instigate; irritate; exasperate; incense; rouse; awaken.

STING, n. *stĭng* [Icel. and Sw. *stinga;* Dan. *stinge;* OHG. *stingan,* to stick, to thrust: Goth. *stiggan,* to sting]: the sharp-pointed weapon possessed by insects; anything that gives acute pain; that which constitutes the principal pain or terror; the point of an epigram: V. to pierce with a sharp-pointed weapon; to pain acutely, as by the conscience. STING'ING, imp.: ADJ. pungent as a sting; paining acutely. STANG, pt. *stăng.* STUNG, pp. *stŭng.* STING'INGLY, ad. *-lĭ.* STING-LIKE, a. like a sting. STING'LESS, a. *-lĕs,* having no sting; harmless. STING'ER, n. *ėr,* one who or that which stings.

STING: a weapon possessed by many plants and small animals, in various forms, employed to pierce and in most cases also to poison, the flesh of animals to be killed for food, or from which injury is received or expected. In plants this office is performed by stiff, sharp, hollow hairs emitting an acrid juice. See NETTLE.) Such stinging-hairs sometimes cause extreme irritation in the skin and mucous membranes of even the largest animals, and hence cause the plants to be avoided, thus protecting the species against harm. The simpler marine animals (Cœlenterates) are widely defended by stinging instruments, consisting of coiled poison-carrying threads which dart from microscopic capsules in the surfaces of the integument. Insects are plentifully provided with piercing weapons. These in some cases are mouth-parts and in others are modified ovipositors. To the first class belong the sharp prolonged jaws, many plant-sucking bugs, or blood-sucking ones, such as the bed-bug, cone-nose and others. In another group are found the gnats, mosquitoes, etc.,

which inflict pain upon large creatures and death upon minute ones by stabbing with their complicated beaks, which consist of a bundle of lancets and saws. (See MOSQUITO.) Many caterpillars are defended by nettle-like hairs, each of which is a specially modified spine, and able to inflict so great annoyance that hairy caterpillars generally are studiously avoided by most animals. The 'sting,' properly speaking, however, is found among insects only in the hymenoptera, as bees and wasps, where it is a modified ovipositor. In wasps it serves a special purpose in paralyzing the insects stowed away alive with the eggs in the nest-cells. Spiders are said to 'sting,' but in reality they bite, in some cases poison. Scorpions, however, possess what is properly enough termed a sting in the pointed telson or tail-piece appended to the extremity of the abdomen, with which a poison-infected puncture is inflicted. Some fishes, as the sticklebacks, surgeon-fish, and notably the sting-rays, have certain defensive spines, by which highly irritating wounds may be inflicted.

STING'-FISH. See WEEVER.

STINGY, a. *stĭn'jĭ* [prov. Eng. *skingy,* cold, nipping; *schinch,* a small bit: F. *chiche,* pinching, niggardly: comp. Gael. *sanntach,* avaricious]: niggardly; sordid; narrow-spirited; penurious. STIN'GILY, ad. *-lĭ.* STIN'-GINESS, n. *-nĕs,* the state or quality of being stingy; extreme avarice.

STINK, n. *stĭngk* [OHG. *stinchan,* to smell sweet or the opposite: Ger. and Dut. *stinken;* Dan. *stinke,* to stink]: strong offensive smell: V. to emit a strong offensive smell. STINK'ING, imp.: ADJ. emitting a strong offensive smell. STUNK, pt. *stŭngk,* or STANK, pt. *stăngk.* STUNK, pp. *stŭngk.* STINK-POT, in *warfare,* especially Chinese, etc., shell or jar, often of earthenware, charged with combustibles, which, on bursting, emit a foul smell and a suffocating smoke. It is used in sieges for driving the garrison from their defenses; also in boarding a ship, for effecting a diversion while the assailants gain the deck. Under the more elegant title Asphyxiated Shell, modern nations have experimented considerably on this mode of harassing an enemy. STINK'STONE [Ger. *stinkstein*], or SWINE'STONE, kind of marble or limestone, usually of dark color, remarkable for the fetid urinous odor which it emits when sharply struck or rubbed: it contains a little sulphur. STINKARD, n. *stĭngk'ërd,* mean paltry fellow: animal producing a strong fetid odor, found in Java and Sumatra. STINK-TRAP (see STENCH-TRAP). STINK-WOOD (*Oreodaphne fœtida*), tree of nat. order *Lauraceæ,* native of the Cape of Good Hope, remarkable for the strong disagreeable smell of its wood: the wood, however, is hard, very durable, takes excellent polish, and resembles walnut. It has been used in ship-building.

STINT, n. *stĭnt* [Icel. *stuttr;* O.Sw. *stunt*, short: Ger. *stutz*, anything cropped or docked: Icel. *stytta*, to shorten]. limit; bound; proportion; quantity assigned: V. to restrain within certain limits; to limit to a certain quantity; to bound; to restrain; in *OE.* to cease; to leave off. STINT'ING, imp. STINT'ED, pp.: ADJ. limited; bounded; checked in growth. STINT'ER, n. *-ėr*, one who stints. STINT'LESS, a. *-lĕs*, unlimited. STINT'EDNESS, n. *-nĕs*, the state of being stinted.

STINT: see SANDPIPER.

STI'PA: see FEATHER GRASS.

STIPATE, a. *stī'pāt* [L. *stīpātus*, pp. of *stīpārĕ*, to crowd or press together]: in *bot.*, pressed together; crowded. STIPATION, n. *stī-pā'shŭn*, an accumulation in the cavities or tissues.

STIPE, n. *stīp* [L. *stīpēs*, a stock, a stalk: It. *stipite*, the stalk or stem of a plant]: in *bot.*, the stem of palms and tree-ferns; the stalk of fern-fronds. STIPEL, n. *stī'pĕl*, a small leaflet at the base of the pinnules of compound leaves.

STIPEND, n. *stī'pĕnd* [L. *stipendĭum*, a tax, a contribution—from *stips*, a contribution in small coin; *pendo*, I weigh or pay]: settled pay for services; salary—term applied to clerical incomes: in the Presb. Church of Scotland, the salary for support of a parochial clergyman—payable at Whitsunday and Michaelmas: see TEINDS: AUGMENTATION, PROCESS OF. STIPENDIARY, a. *stī-pĕnd'ĭ-ėr-ĭ*, performing services for stated wages or salary, as a *stipendiary* magistrate: N. one who receives stated salary for services; a paid magistrate. STI'PENDLESS, a. *-lĕs*, without a stipend.—SYN. of 'stipend': wages; allowance; income; pay; payment.

STIPITATE, a. *stĭp'ĭ-tāt* [L. *stīpēs* or *stīpĭtem*, a stalk]: in *bot.*, supported on a stalk which is neither a petiole nor a peduncle. STIPITIFORM, a. *stĭ-pĭt'ĭ-fawrm* [L. *forma*, shape]: resembling a stalk or stem.

STIPPLE, v. *stĭp'pl* [Dut. *stippelen*, to speckle, to dot—from *stippel*, a speckle]: to engrave by means of dots, instead of, as in the ordinary method, by lines. STIP'PLING, imp. *-plĭng*. STIPPLE, or STIPPLING, n. a mode of engraving by dots, in imitation of chalk-drawings. STIPPLED, pp. *stĭp'pld:* ADJ. worked in stippling.

STIPULATE, v. *stĭp'ū-lāt* [L. *stipulātus*, bargained, covenanted; *stipulāri*, to bargain—from old L. *stipŭlus*, firm, strong: It. *stipulare:* F. *stipuler*]: to make an agreement with any one; to settle terms; to bargain. STIP'ULATING, imp. STIP'ULATED, pp. agreed: contracted. STIP'ULATOR, n. *-tėr*, one who stipulates. STIP'ULA'TION, n. *-lā'shūn* [F.—L.]: contract; agreement or bargain: in *Roman law*, an agreement attended with certain solemnities. —SYN. of 'stipulation': covenant; bargain; engagement; condition.

STIPULE, n. *stĭp'ūl* [F. *stipule*—from L. *stipŭla*, a stem, a stalk: It. *stipula*]: in *bot.*, a modified leaflet at the base of another leaf; leafy appendage at the base of the leaf-stalk in many plants. Sometimes the S. is solitary but frequently there are two, one on each side of the leaf-stalk. They are of very various form and character, often very dissimilar to the leaf with which they are connected. In some plants they are large, enveloping the young leaf, but soon falling off; in many they are deciduous; but in many they are permanent as the leaf itself. Their presence or absence, their deciduous or persistent character, and other peculiarities, form distinctive characteristics not only of species and genera, but of natural orders. They are generally green, like leaves; but sometimes membranaceous. In some plants they assume the form of spines: in *Cucurbitaceæ*, that of tendrils. Organs of the same nature with stipules appear at the base of the leaflets of some compound leaves. STIP'ULA'CEOUS, a. *-ū-lā'shŭs*, consisting of or resembling stipules; growing on stipules, or close to them STIP'ULAR, a. *-lĕr* resembling a stipule. STIP'ULARY, a. *-ĭ*, in *bot.*, applied to organs occupying the place of stipules, such as tendrils. STIP'ULATE, a. *-lāt*, furnished with stipules. STIP'ULED, a. *-ūld*, furnished with stipules or leafy appendages.

Leaf with Stipules, *s, s.*

STIR, v. *stĕr* [AS. *styrian*, to move, to stir: Icel. *styrr*, a stir, disturbance: Ger. *stören*, to disturb: Dut. *storen*, to vex]: to move; to put into motion; to agitate; to incite; to rouse; to stimulate; to move one's self; to bring into discussion or notice: N. tumult; bustle; public disturbance or disorder; agitation. STIR'RING, imp.: ADJ. putting in motion; busy and active; exciting, as a speech: N. the act of stirring or moving. STIRRED, pp. *stĕrd*. STIR'RER, n. *-rĕr*, one who or that which stirs. STIR'ABOUT, n. *-ă-bowt*, a dish of oatmeal stirred among cold milk or water; oatmeal porridge; also known in *Scot.* as *crowdy*. To STIR UP, to inflame the passions of; to put into motion or action; to enliven.—SYN. of 'stir, v.': to incite; move; arouse; animate; excite; provoke; quicken; instigate; raise.

STIRK, n. *stĕrk* [Ger. *stïer*, a bull: AS. *styric*, a heifer: Gael. *stuir*, a male calf: see STEER 3]: in *Scot.* and *prov. Eng.*, a young bull, ox, or heifer.

STIRLING, *stĕr'lĭng:* market-town, river-port, and royal parliamentary, and municipal burgh, cap. of the county of Stirlingshire; on the s. bank of the Forth, 36 m. w.n.w. of Edinburgh, 29 m. n.n.e. of Glasgow by railway. Like Edinburgh, which it resembles in its main features, it owes its origin doubtless to the strong natural fortress of its Castle Hill. From this hill, covering the declivity which slopes n. and e. to the plain, extends the oldest part of the town, around which are numerous streets; while many villas have arisen in the environs. The Castle Hill, which rises gradually from the e., and fronts the w. with a steep

precipitous wall of basaltic rock, overlooks the beautiful and fertile *carse* or flat along the banks of the Forth. Among the more prominent public buildings and institutions are the East and West Churches—the former erected by James IV. about 1494; and 'Mar's Work,' an incomplete structure, richly ornamented, built by the Earl of Mar, Regent of Scotland, who died 1572. In the more ancient quarters, one or two pleasing specimens of old Scotch domestic architecture remain: of these, 'Argyle's Lodging,' with its pinnacled round towers and decorated windows, is the chief: it is now a military hospital. The town-house is surmounted with a spire, and has the old jail attached. It contains the jug or standard of dry measure which was given to the keeping of the town by the Scottish parliament; while Linlithgow is said to have received the firlot; Edinburgh, the ell, etc. Cowan's Hospital, founded 1639, is an object of interest. There are also an athenæum, corn exchange, and numerous excellent schools. A magnificent art institute, Smith Institute was opened 1874.

The importance of S. in early times was due to its situation and its defenses. At the head of the navigation of the Forth, when there were no regular ferries, S was the key to the Highlands, and the possession of it and its means of n. and s. communication was of great importance. The town, besides, was strongly fortified both by nature and by art. The ancient bridge of S., whose age is unknown, but which was in existence 1571, is of four arches, and was defended at each end by gates and towers. This bridge was, until recent times, the only one by which wheeled carriages could cross the Forth. Vessels of 150 tons can reach the port of S.; but its commerce by river is now less important than before the days of railways. The rich agricultural, mining, and manufacturing districts around give the town a basis of prosperity. Manufactures of ropes, malt, leather, soap, and mineral oils are carried on. Pop. royal burgh (1901) 18,697.

S. (formerly *Stryvelyne*, or *Estrivelin*) is one of the most ancient and historically important towns of Scotland. It is of unknown antiquity; and there is no record from which the date of the foundation of even the castle can be determined. Its rock must have been the site of a frontier fortress from the earliest times. The place soon became the most important fortress in Scotland, and the centre of the long struggle between England and Scotland. Alexander I. died in the castle 1124. In the vicinity the battle of S. was fought 1297 (see WALLACE). The town was taken by Edward I., after a siege of three months, 1304. The famous battle of Bannockburn (q.v.) occurred in this vicinity 1314. The castle was the birthplace of James II. and of James V. James III. built the parliament house in the castle, and otherwise improved and embellished the fortress. James V. built the palace, the walls of which are profuse in grotesque ornamentation. In the older part of the castle is the 'Douglas Room,' in which William, Earl of Douglas, was assassinated by James II. In 1651, after the battle of Dunbar, the castle was taken by Monk and

it withstood a siege by the Highlanders 1745. The views from the towers of S. castle is unsurpassed in beauty. Westward, the rich vale of Menteith stretches away to the Highlands, where Ben Lomond, Ben Venue, Ben A'an, and Ben Ledi close the scene. The glittering 'links' of Forth are seen in the Carse of Stirling, surrounded by fertile fields and luxuriant woods; the Abbey Craig, crowned by the Wallace Monument, rises boldly on the n.; while on the e. are seen the picturesque ruins of Cambuskenneth Abbey.

STIR'LING, Earl of (or LORD STIRLING): name commonly applied to WILLIAM ALEXANDER, maj.gen. in the Amer. revolution: 1726–1783, Jan. 15; b. New York. Like his father, James A. S., he was highly educated and addicted to science. After the French and Indian war, in which he held commissions, he spent much of his wealth in England in a fruitless suit to establish his claim to the title and estates of Stirling. Returning to New York, he was surveyor-gen. and a member of the provincial council Appointed col. 1775, he made a daring expedition that captured a supply ship of the enemy. He was appointed brig.gen. 1776. In the battle of Long Island, he was first and last, exhibiting great intrepidity, and was captured after making good the retreat of his troops. Exchanged, he was made maj.gen., and fought at the Brandywine, Germantown, and Monmouth. He was active in exposing Gen. Conway's conspiracy against Washington. After the war he was influential in founding King's (now Columbia) Coll., and the N. Y. Society library.

STIR'LING, Sir THOMAS: British soldier: 1735–1808, May 9; b. Scotland. He was capt. of the royal highland regt. which engaged in the Lake George and Lake Champlain expeditions against the French 1758–9, aided in the siege of Niagara, went with Gen. Amherst to Montreal; was afterward stationed at Fort Chartres, Ill., and at Philadelphia; and took part in many battles of the revolution—among them that on Staten Island, that of the Brandywine and of Springfield, N. J. He was promoted maj.gen. 1782, lieut.gen. 1796, and gen. 1801. He was made a baronet 1796.

STIR'LINGSHIRE, *-shēr:* county in Scotland, the borderland between the Highlands and Lowlands; of very irregular outline, bounded n. by Perthshire, and by the river and Firth of Forth; extreme length n.w. to s.e. 45 m., extreme width n. to s. about 18 m.; 467 sq. m. A considerable part of S. is occupied by the carses of Stirling and Falkirk, formerly covered for the most part with unproductive moss. On the removal of the moss-soil, part of which was floated off into the Forth by the agency of running water, a rich clay-soil, of various depths, from a plow-furrow to 20 and even 30 ft was reached, and is now cultivated with marked success. The chief rivers are the Forth (q.v.), the Carron—navigable for small vessels to Carron-shore—and the Endrick. Loch Lomond (q.v.) is the only important lake in the county. N.e. from it a spur extends from the Grampian Hills, whose chief eleva-

lon is Ben Lomond (q.v.). The Lennox Hills (highest 1,894 ft.), in the centre of the county, occupy about a fourth of its area. S. is remarkable for minerals, especially ironstone, wrought extensively at Carron (q.v.). A coal field extends along the s.e. Woolen goods, etc. are largely manufactured, especially at Alva, Bannockburn, and in the neighborhood of Stirling (q.v.). Of the area of 298,579 acres, there were (1881) 114,191 acres under all kinds of crops, bare fallow, and grass. There were 30,992 under grain crops (2,811 in wheat); under green crops, 9,998 (4,658 in turnips); 23,663 under clover and grasses under rotation; 48.101 under permanent pasture and meadow; only 12,483 under forest. Pop. (1881) 112,443; (1901) 142,291.

STIRRUP, n. *stĕr'rŭp* or *stĭr'-* [AS. *stirap;* Ger. *steg-reif,* a rope or strap for mounting on horseback—from AS. *stigan;* Ger. *steigen,* to mount, and AS. *rap;* Ger. *reif,* a rope: Gael. *streap,* to climb]: the foot-iron suspended from a saddle; among *seamen,* a rope secured to a yard having a thimble at its lower end, and supporting portions of the tackle for managing the sails. STIRRUP-CUP, a parting cup taken on horseback. STIRRUP-LEATHER or -STRAP, the strap that supports a stirrup.

STITCH, n. *stĭch* [a modification of Eng. *stick,* a thrust with a sharp instr.: Ger. *sticken,* to embroider: Dan. *stikke,* to stick, to stitch]: a single loop or link; a single pass of a needle in sewing: sudden, sharp, shooting, local pain, as in the side (see below): V. to pass a needle with a thread through a piece of cloth and back again; to sew or unite with needle and thread; to practice sewing. STITCH'ING, imp.: N. work done by sewing. STITCHED, pp. *stĭcht,* sewed together. STITCH'ER, n. *-ĕr,* one who or that which stitches. STITCH'ERY, n. *-ĕr-ĭ.* in *OE.,* needlework, in contempt. To STITCH UP, to mend what was rent.

STITCH, *stĭch,* in the Side: popular name for the pain felt in pleurisy. It occupies a point or small spot on a level with, or just beneath the breast on the affected side; and patients state that they feel as if some sharp stabbing instrument were being driven in at that spot, whenever the act of inspiration goes beyond a certain limit (see PLEURISY).—A simple modification of stitch is frequently caused by exercise soon after a full meal—the pain being lower in the side, and usually removed by stooping: hence the popular remedy for this pain is to mark with the finger a cross upon the foot.

STITCH'WORT (*Stellaria*): genus of plants of nat. order *Caryophylleæ,* having a calyx of 5 leaves, 5 deeply-cloven petals, 10 stamens, 3 styles, and a many-seeded capsule opening with six teeth. The species are numerous—annual and perennial plants, with weak stems and white flowers, which in some are minute, and in others large enough to be ornamental to woods and hedge-banks, as in the Wood S. (*S. nemorum*) and the Greater S. (*S. Holostea*). To this genus the common Chickweed (q.v.) is now generally referred.

STITH, *stĭth,* WILLIAM: historian: 1689–1755; b. Va.; brother-in-law of Peyton Randolph, and nephew of Sir John Randolph. After Episc. ordination in England, he was head of the grammar school of the Coll. of William and Mary; chaplain of the Va. house of burgesses 1738; rector of Henrico parish and pres. of William and Mary Coll. 1752–55. He pub. a painstaking hist. of Va. from its settlement to 1747, founded on valuable documents since lost by fire. An ed. restricted to 250 copies was reprinted 1866. He pub. also *The Nature and Extent of Christ's Redemption* (1753).

STITHE, or STITH, or STYTH, a. *stīth* [AS. *stīth,* se[illegible] hard]: in *Scot.* and *OE.,* steady; strong; hard; severe.

STITHY, n. *stĭth'ĭ* [Icel. *stethi;* Sw. *städ,* an anvil]: an anvil; a smith's workshop. STITH, or STITHE, n. *stīth,* in *OE.,* an anvil.

STIVER, n. *stī'vĕr* [Dut. *stuiver*]: Dutch penny-piece, one-twentieth of a guilder (value about 2 cents); hence, anything mean or worthless. See GUILDER: FLORIN.

STOAT, n. *stōt* [from a supposed analogy to a stallion-horse: AS. *stodhors,* a stallion or stud horse]: a weasel or ermine: see ERMINE.

STOB, n. *stŏb* [a form of STAB]: in *Scot.* and *OE.,* a splinter of wood; a pointed stake of wood for driving into the ground; an awl.

STOCCADO, n. *stŏk-kā'dō* [Sp. *estocada,* a thrust: Ger. *stock,* a stick]: in *OE.,* a thrust with a rapier in fencing.

STOCK, n. *stŏk* [AS. *stocc,* the stock of a tree: Gael. *stoc,* a trunk: Ger. *stock,* a stick, stump of a tree: Icel. *stokkr;* Sw. *stock,* trunk, log]: stem or trunk of a tree or plant; stem or branch in which a graft is inserted: anything fixed or set; a post; a log; a piece of solid wood forming the sustaining part, as of an anchor or a firearm; the handle of anything: a stupid senseless person: the original progenitor; the race or line of a family: stiff band used as a tie for the neck: in *Scrip.,* an idol. STOCKS, n. plu. wooden frame with openings into which the legs of a person may be *stocked* or set fast, formerly used as a temporary punishment for petty crimes and misdemeanors (see below): certain flowers having stems or stalks: the timbers on which a ship rests while building. STOCK'ISH, a. in *OE.,* hard; like a block of wood; stupidly inert. STOCK-DOVE, the wild pigeon of Europe (see below). (STOCK-STILL, a. motionless, as if a stock or log. STOCK-LOCK, a lock in a wooden case or frame. ON THE STOCKS, not yet finished, referring to the supports of an unfinished ship in a building-yard.—SYN. of 'stock': post; body; race; lineage; family.

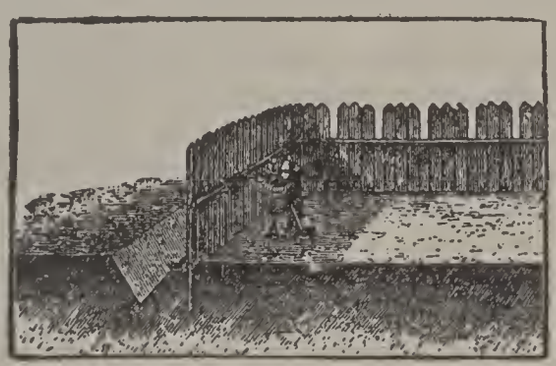
STOCK, n. *stŏk* [from STOCK 1, the primary notion of 'something permanent' being also here evident]: money or goods employed in trade, manufacturing, banking, etc.; the beasts, etc., on a farm; the money collectively lent by individuals to a government or public company; the public funds (see FUND); government scrip: supply provided, quantity on hand; store or accumulation from which supplies may be obtained: in *cookery*, the broth or boiled meat, etc., before it is converted into sauces, soups, etc.: ADJ. serviceable for constant use or application, as a *stock* sermon, permanent; standing: V. to store; to supply; to fill sufficiently. STOCK'ING, imp. STOCKED, pp. *stŏkt*. STOCK BROKER, one employed in buying and selling for others stock in the public funds, or the stocks of joint-*stock* companies. In most principal cities stock exchanges are established, and the stock or share brokers are members of such exchanges, and are bound to transact business under their rules. STOCK-EXCHANGE, building where stocks are bought and sold; association or company of stock-brokers (see below). STOCK-FARMER, farmer who attends chiefly to breeding and rearing of live-stock, as cattle, sheep, etc. STOCK, flower (see below). STOCKHOLDER, a proprietor of stock in the funds, or of shares in a public company. STOCK-JOBBER, a dealer or middleman in the sale or purchase of *stocks* or *shares*; a gambler in stocks. STOCK-JOBBING, art or practice of dealing in stocks. STOCKMAN, in *Australia*, one in charge of the live-stock; a herdsman. STOCK-TAKING, periodical making of an inventory of the quantity and cost-value of the goods on hand, and of fixtures and tools—by a merchant or tradesman. STOCK-IN TRADE, goods kept for sale by a merchant, trader, or shopkeeper; the fittings and appliances of a workman. DEAD STOCK, goods for which a market cannot be found; in *agri.*, the implements of husbandry and stored-up field-produce, as distinguished from LIVE-STOCK, the domestic animals kept and reared on a farm. TO STOCK AN ANCHOR, to fit it with a stock. TO STOCK DOWN, to sow, as plowed land with grass-seeds.—SYN. of 'stock, n.': capital; principal; store; fund; accumulation; hoard; supply; provision; cattle.

STOCK, n. *stŏk*: OE. for STOCCADO, which see.

STOCK, or STOCK GIL'LYFLOWER (*Matthiola*): genus of plants of nat. order *Cruciferæ*, having cylindrical or compressed pods, and a stigma consisting of two upright appressed plates, the outer side of which often rises into a knob or horn. The species are herbaceous or half shrubby, natives of countries around the Mediterranean Sea; most of them thickly clothed with white or grayish stellate hairs; the flowers in racemes, and generally beautiful and fragrant. Some of the species have long been much cultivated, and many fine varieties have been produced by cultivation. *M. incana* is probably the parent of the greater number of the cultivated kinds with hoary leaves, known as Brompton S., etc.; while those with smooth leaves, called Ten-week S., German S., etc., are referred to *M. annua*, *M. glabra*, and *M. fenestralis*, perhaps mere varieties of one

species. Some sandy shores produce a species, *M. sinuata,* whose large purple flowers are fragrant only at night —a characteristic of several other species. Stocks are raised by gardeners always from seed, which even the double kinds often produce, a multiplication of the petals having taken place without loss of the parts of fructification. Of the seedlings, however, some produce double, others single flowers, so that only some gratify the cultivator. The hoary-leaved stocks are generally treated as biennials, though, in reality, they may almost be reckoned perennial; and it is not desirable that they should flower the first year, as the plants become stronger when they remain without flowering till the second year, and produce richer racemes of flowers. The smooth-leaved stocks are treated as annuals.—The beautiful little annual, Virginian Stock (*Malcolmia maritima*) does not belong to this genus, though of the same nat. order: it is a native of the shores of the Mediterranean, and has become a great favorite, almost rivaling mignonette.

STOCKADE, n. *stŏk-ād'* [from Eng. *stock:* F. *estocade,* a thrust or stab into: It. *stoccata,* a thrust in fencing]: a line of strong stakes or posts fixed in the ground as a barrier



Stockade.

to the advance of an enemy; an inclosure made with posts: V. to fortify with strong posts fixed in the ground. STOCKA'DING, imp.: N. a line of strong posts stuck upright in the ground. STOCKA'DED, pp.

STOCKBRIDGE, *stŏk'brĭj:* a town in Berkshire co., Mass.; on the Housatonic river and the Housatonic railroad; 8 m. n. of Great Barrington, 17 m. s.-by-w. of Pittsfield; 93 m. n. of Bridgeport. It is beautifully located amid picturesque mountain scenery and in the vicinity of Lake Mahkeenac and Monument Mountain; is a charming summer home and tourists' resort; and was the tribal home of the Housatonic (known also as Stockbridge) Indians. It contains 4 churches, public library, 1 national bank (cap. $200,000), public park, monument to Jonathan Edwards (q.v.), and several schools. The park, library, and one of the churches were joint gifts of the Field brothers, Cyrus West, David Dudley, Henry Martyn, and Stephen Johnson, the church being a memorial to their parents—their father having been long the pastor of the Congl. Church in S.—Pop. (1900) 2,081; (1910) 1,933.

STOCK'-DOVE (*Columba œnas*): the wild Wood Pigeon of Europe; called Stock either from nesting in the stocks of trees, or because it was supposed to be the original stock (now regarded as the Rock Pigeon, *C. livia*) of the domestic breeds. It is not the Ring-dove or Cushat, to which its name is sometimes applied, but smaller, without the white neck-ring, and more confined to woody regions; otherwise it is similar. From the Rock Pigeon it differs in having black in spots instead of bars on the wings. It has not been domesticated, not breeding in confinement.

STÖCKER, ADOLF, German theologian and social reformer: b. Halberstadt 1835, Dec. 11. After studying theology and philology in Halle and Berlin, he was made pastor at Seggerde (1863) and eventually court and cathedral preacher at Berlin. His principal importance is owing to the fact that in opposition to the Social-Democrats he founded, in 1877, a Christian Socialistic party. This new association won numerous adherents in only a few places, but the idea of Christian Socialism has been widely accepted by a large number of religious teachers In his fiery zeal and activity against his opponents he was particularly violent in his treatment of the Jews, and he thus hindered the practical success of his theory. In 1880 he was elected to the Reichstag and allied himself with the extreme conservatives. But his socialistic activity, by which he was led more and more to take the attitude of a reforming agitator, displeased the government and in 1890 he was dismissed from his office as court-preacher. He is president of the Berlin City Mission; Member of the Upper Synod; and in 1892 became editor of the *Deutsche Evangelische Kirchenzeitung*. He is the author of a volume of *Sermons for the People* as well as of *Speeches*. He has also published many Socialistic tracts.

STOCK-EXCHANGE· organization of persons, and their place of meeting, for the business of selling or buying such stocks as have been recognized or listed for such dealing. English usage limits the term stocks to government stocks, annuities, etc., while the term shares denotes the stock of railroads, banks, etc. In American usage a great variety of bonds and shares all are included under stocks, and are subject to Stock-Exchange transactions when they have been placed on the Stock-Exchange list, or 'listed.' Bonds representing national, state, county, and city engagements to pay debts, and the bonds or shares of railroads, banks, mining, manufacturing, telegraph, telephone, insurance, etc., companies, are dealt in as stocks, if they are important enough to be listed. Two kinds of sales of stocks are made: that of the exchange in a regular way and for *bona fide* sale; and that of the street outside, called jobbing, and generally speculative, for mere betting on

what prices will be. The form for the first is by a call of the list of the stocks. This is made twice a day, and these two calls mark what are known as the first board and the second board. The govt., state, and railroad bonds are called in a room specially allotted to that purpose. But in practice the sales are made outside these formal calls—brokers crying out what and how many shares they offer, and at what price, or what they want to buy, and at what price. These cries appear to make indescribable confusion to the unaccustomed ear, yet are readily distinguished and understood by those engaged, and transactions closed and noted accurately. Persons appointed for the purpose take record of these sales, and furnish a report, which is sent in all directions, for public information, or to offices where buying and selling of stocks is privately conducted. The record is made with free use of abbreviations: in the case of bonds, c. means coupon, r. registered, and o. b. delivery at the opening of the books of transfer. 'L. S. 400: 125: s. 60' means 400 shares of Lake Shore and Michigan Southern railroad stock at $125, to be delivered at the seller's option any time within 60 days; but if recorded 'b. 60,' the option is with the buyer.

Stock is bought and sold not only outright, with payment in full, but also without intent to deliver, on what is called a margin, the object being to speculate in its future value. The buyer puts down 10 per cent. of the par value of the stock, and awaits the turn of the market. If this is downward, the buyer's broker either sells, if the fall goes so low as to be under the buyer's margin, or calls for more margin. If it is upward, the buyer sells at a favorable time, and pockets the amount realized by the rise, also recovering his 10 per cent. The broker's commission for selling or buying stocks is $\frac{1}{8}$ of 1 per cent. to all persons not members of the exchange, called also the brokers' board. Members pay $2 per hundred shares. To contract to deliver stock at a future day, expecting meanwhile to buy at a reduced price, is called selling 'short;' and those who do this, and thus desire a fall of values, and try presumably to secure fall or shrinkage by efforts to depress or squeeze smaller holders, are called 'bears.' Those are termed 'bulls' who have bought for a rise of price, and wish to toss prices upward: they are said to be 'long' of the stock. To sell a 'put' is to agree to buy a certain number of shares of a particular stock, at a certain price, within a stated time, provided the buyer of the put and seller of the stock is prepared to deliver it at the time and price named. To sell a 'call' is to agree to deliver in the same way. The parties agree on the cost of these 'stock privileges,' as they are called, according to the time involved, the condition of the market, etc.

The London Stock-Exchange was organized 1773; and its building was erected 1801, on the basis of 400 shares of £50 each, the shareholders standing as members, and other brokers as subscribers. The number of these had reached about 1,000 in 1854, when £16,000 were spent on an extension of premises. A further extensive enlargement was made 1885, when the number had risen to above 2,500. The income is about £130,000 per annum, and the property is immensely valuable.

In the United States, Philadelphia had the earliest Stock-Exchange. That of New York was organized 1817. It has 1,100 members, and a handsome building on Broad and New streets, with a great hall for doing business, and vaults for storing securities said to be the best ever constructed. A seat costs about $75,000, but as much as $91,000 has been paid. As many as 3,300,000 shares of stock have changed hands in a single day. On the death of a member, his seat is sold for the benefit of his heirs, less his unpaid dues, and if he dies in good standing, $10,000 in addition is paid them from a gratuity fund maintained by assessing each member $10 on the occasion of a death. The rules of the Stock-Exchange are very strict; a high standard of integrity is maintained; and all disputes are settled by a committee of arbitration. See EXCHANGE; COMMODITY EXCHANGE; CURB MARKET; STOCKS; etc.

STOCKHOLDERS: A stockholder is one who owns stock in a corporation or joint stock company, and who has been vested with certain rights and liabilities by law, by virtue of his relation to other owners of stock and to creditors of the corporation. The term shareholder is used commonly interchangeably with stockholder. When a corporation is formed and the books of the company are opened, individuals subscribe for stock or shares in the company and certificates are issued to them as evidence of their right in the company which is granted by virtue of the sale of stock, the certificates of stock being merely the evidence of the transaction. Loss of certificates, or the fact of their not being issued cannot relieve the owner of stock of his rights, or of his liabilities. Although stock may be paid for in services, or good will, or patents, or property, as well as in money or negotiable paper, the stockholders as soon as they acquire membership in the corporation stand on the same footing, and have equal privileges. The number of shares owned regulates the proportion of interest to be drawn by the individual, and the voting power in the affairs of the company. Any person who has legal capacity to own personal property may be a stockholder, and municipal and private corporations may be stockholders in other corporations within limitations contained in their incorporation. A manufacturing corporation may not subscribe to the stock of a bank or of

1. Royal Palace, Stockholm.
2. View of Stockholm.

a railroad, but may in payment of a debt, take stock in such other corporation, and may hold it and enjoy the same rights as other stockholders. The rights of all stockholders are represented by the corporate management, usually a board of directors. A corporation has the right, through its management, to carry on the corporate enterprise as against all persons including a minority of the shareholders, in a manner and for the purposes set forth in its constitution. The board of directors can be controlled only by action of a majority of shareholders. It is understood that the majority of shareholders shall govern in all matters coming within the act of corporation, and all shareholders are bound by the acts of the majority represented by the management.

Shares of stock give the holder a fixed right in the division of the profits or earnings of the company so long as it exists, and of its effects when dissolved.

At corporate meetings each shareholder has a right to vote, and this cannot be taken from him. The right to vote by proxy does not exist unless so stated in the constitution of the company. The shareholder has the right to inspect the company books either personally or through a representative or attorney.

It is supposed that stock is paid for at par, and that the number of shares sold represents the working capital of the corporation. A creditor may enforce his right to have the nominal value of capital stock paid in, even to making the directors call upon the stockholders to pay a pro rata share on their stock.

The liability of a stockholder for the debts of the company is fixed by statute and differs in the various states. In some states a stockholder can be held for a sum equal to his subscription; special liabilities which makes the stockholder responsible for other amounts or for particular debts, also exist under the laws of some of the states.

Regarding the liability of shareholders in a national bank, it has been held that the shareholders are individually responsible, equally and ratably, and not one for another, for all contracts, engagements and debts of such association to the extent of the amount of their stock therein, at the par value therefor, in addition to the amount invested in the shares.

Irregular or fraudulent transfers may be set aside if it can be shown that there was intention to escape liability to the detriment of creditors.

A subscriber to stock is presupposed to know the obligations assumed and ignorance will not excuse him from liability to creditors.

STOCKHOLM: Sweden; capital of the country on the Mälar Sea (Lake Mälar), 440 m. s.w. of Saint Petersburg. It is picturesquely situated on a cluster of islands, connected with the mainland by bridges, chief of which

are the Norrbro and Vasabro, joining the stadtin or city with the n. side of the strait. The city, without its northern accessories, might impress one as another Venice, especially in approaching it from the Baltic or from Moseback Hill. Yet it surpasses in natural attractions the Venetian city. The largest island is Gustavsholm, containing the city proper, and with the islands of Riddarsholm and Helgeandsholm, is the oldest section. Its antiquity and irregularity render this part most interesting. Other islands contain the modern-constructed town. The houses are frequently coated with stucco in light colors or white. The buildings of note are the palace of the 17th c., with Corinthian pillars adorning the façade, and an edifice of symmetrical proportions. The oldest church is St. Nicholas (1264), in which Swedish sovereigns are crowned; the Riddarsholm Kyrka contains the remains of a long line of kings and has other historical interest. In Norrmalm is the church of Adolphus Frederick and the National Library, containing 250,000 books, and 8,000 MSS. On the northern mainland stands the National Museum, a fine Renaissance edifice, which contains many antiquities, coins, drawings, engravings, etc. There are, too, the governor's house, facing the quay where an obelisk commemorates Gustavus III.; the Ridderhus or Senate Chamber; the Rigsdagshus or House of Parliament; exchange, mint, town-house, with courts of law; ethnographical museum with numerous Scandinavian antiquities; theatres, opera-house, arsenal, and barracks. There is a medical college, technological institute, navigation school, school of design, etc., also benevolent institutions; literary, scientific and artistic associations, etc. Chief among the latter are the Swedish Academy, Academy of Sciences, celebrated by the name of Berzelius; musical academy; medical, horticultural and agricultural societies. Ship-Island, e. of the city island, is headquarters of the Swedish navy, and contains shipbuilding yards, marine repair-shops, etc. Farther e. are the islands containing the zoological gardens. All the islands have communication with each other by bridges, tramways, steamboats, etc. The recreation grounds and promenades are attractive, especially Djurgarden, Haga Park and Carlberg. The manufactures are chiefly textiles, porcelain, pottery, sugar, tobacco, cotton, ironware, and machinery. Trade is considerable, and the principal exports are iron, copper, tar, and timber. The imports: colonial produce, wine, salt, fruit, etc. Inland trade is also important. Stockholm was founded in 1260. Subsequently fortified, it withstood several memorable sieges. The War of Liberation, expelling the Danes, established an independent Swedish kingdom. Pop. (1901) 301,697.

STOCKING, n. *stŏk'ĭng* [see STOCK: Ger. *stock*, stump of a tree]: cover for the *stock* or leg; cotton or worsted or other close covering for the foot and leg. See HOSIERY; STOCKING-FRAME.

STOCKING-FRAME: machine for weaving stockings, knitting drawers, and similar garments. At first, as invented by William Lee of Woodborough, Nottinghamshire, England, it was very simple, but has now become extremely complicated, though the simple principle of its original is retained as the essential. Its beginning was

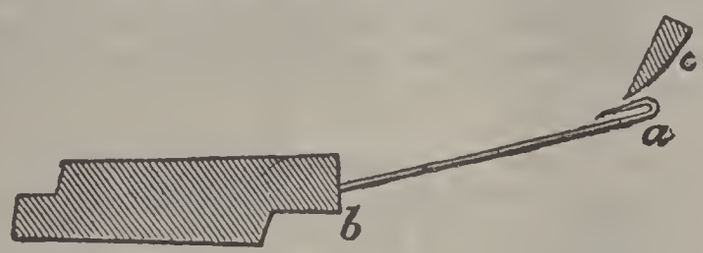


Fig. 1.

from the art of Knitting (q.v.). In knitting only one thread is used, and this formed into a succession of loops on a knitting-needle; each of these loops, then, has in succession another loop passed through it by means of another and similar needle, and this operation is carried on successively until the whole fabric is made. In the S.-F., instead of

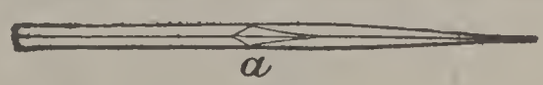


Fig. 2.

one needle to hold the stationary loops while those of the moving row are being inserted, there are as many needles as there are to be loops in the breadth of the web, and these are so made as alternately to form and give off the loops. The form of this needle is shown in fig. 1, and fig.

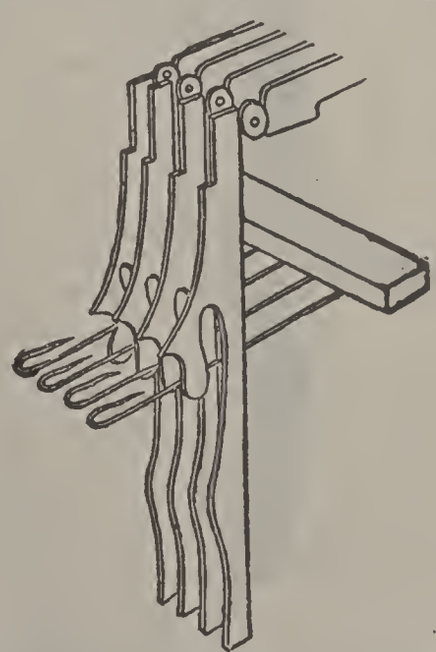


Fig. 3.

2 shows a front view of its point, in order to exhibit a small indentation, *a*, into which the bent point of the needle *a* (fig.1), is easily pressed. The other end of the needle is fixed into a small casting of tin, *b* (fig. 1), formed out into a frame, and to be screwed tightly in, side by side with the rest of the needles. Between the needles are

placed thin plates of lead or pewter, called *sinkers* (fig. 3), in two rows; in one row, the sinkers move freely on an axis (fig. 3); in the other, they all are fixed to a bar, and move with it. The object of the loose ones, or *jack-sinkers*, is to make loops by pressing the thread down between the needles (fig. 4 and 5 at *a*). The other row on the bar, or *lead-sinkers*, are brought down, to press simultaneously on the hooks of the needles, and press their points down into

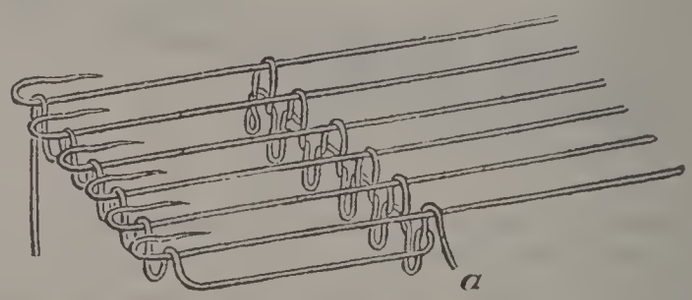


Fig. 4.

the little depression *a* (fig. 2), so that they will pass through the loops without catching one way, and take them up when opened and drawn in the contrary direction. The

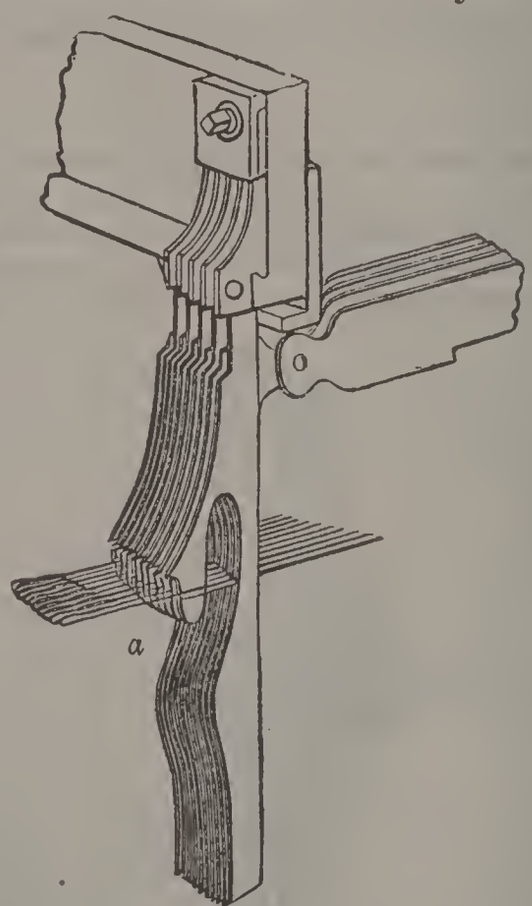


Fig. 5.

point of the lead-sinker is seen in fig. 1, *c*. These are the essential parts of a S.-F., which contains so vast a number of needles and sinkers, and such nice mechanical arrangements for giving them their regular movements, that few machines have so complicated an appearance to the observer.

STOCKPORT, *stŏk'pōrt:* town of England, county of Cheshire, and partly of Lancashire, on the river Mersey, 6½ m. s.e. of Manchester by railway, 46 m. e.n.e. of Chester, 37 m. e. of Liverpool. It stands upon an elevation, in terraces; is irregularly built, but highly picturesque. There are churches of various denominations, the chief of which are St. Mary's, St. Thomas', St. George's, St. Peter's, St. Paul's, and Christ Church. Other noteworthy buildings are the Mechanics' Institute, market hall, free library, technical and grammar schools, and infirmary. The museum is situated in Vernon Park. The railway viaduct on the London and North-Western railroad is of fine proportions, and spans a great part of the town. The staple manufacture is cotton; there are numerous factories and industrial works—including print, dye, and bleach works, and extensive hat factories, iron and brass foundries, breweries, and brick-yards. Pop. (1901) 92,806.

STOCKS: apparatus of wood, much used in former times in England for punishment of petty offenders. The culprit was placed on a bench, with his ankles fastened in holes under a movable board, and was kept there for an hour or two. The period when stocks were introduced is uncertain; but in the second Statute of Laborers, 25 Edw. III. (1350), provision is made for applying the stocks to unruly artificers; and 1376 the commons prayed Edward III. that stocks should be established in every village. Each parish had in later times its stocks, usually close to the churchyard, but sometimes in a more retired spot; and in some country places they still are or were recently seen, and not entirely disused. Combined with the stocks was often a whipping-post for flagellation of vagrants.

STOCKS: the term used to designate the associated capital of a corporation. The stock is divided into *shares* of equal amounts, now almost universally represented by certificates in the names of the owners, to facilitate negotiation. In common parlance the certificates have come to be called stock.

Primarily stock was of one class only, and many corporations still have but one class; but the utility of other classes led to the distinction of the original as *common* or *ordinary* stock. The other classes include *preferred, founders', debenture, deferred,* etc.; the first-named being the most generally used; it is frequently subdivided into first, second, etc. As the name implies, preferred stock enjoys certain specific prior rights, accorded by the owners of the common stock, by reason of circumstances, such as the provision of additional capital required for the business. The priority generally accorded is as to *dividends* payable out of earnings; but frequently the right to prior payment of the capital in case of winding up of the corporation, and less frequently the temporary control of the management are also given; in recent years

the dividend rights have been made cumulative in many cases; i.e., if not paid in one year, owing to insufficient profits, the dividend accumulates as a charge against future earnings. Upon the other hand the privileges are often limited, upon the theory that the common stock represents the actual ownership of the property; thus, preferred dividends are fixed usually at a certain rate, whereas dividends on common stock are rarely limited; but in some instances the preferred is accorded the right of participation with the common in any surplus after the latter has had a definite profit. Preferred stock is also in some instances subject to retirement out of profits, and, again, in some corporations, is denied a voice in the management.

The very general practice of incorporating industrial business enterprises in the United States during the past years has caused a change in the standing of the two classes of shares. The preferred issues usually represent the property taken over and the working funds, in short, tangible assets; the common shares in very large measure represent 'good-will' and other intangible elements; frequently the value of the latter is therefore absolutely dependent upon the future—a capitalization of expectations too often not realized. The preferred stock is the controlling factor, and in some cases the common is practically ignored. A few railway corporations, by reorganizations, have been similarly capitalized. The practice has given cause for serious criticism of corporate financing; the excessive issue of 'watering' of stock being regarded reprehensible. The other classes of stock are rarely used in the United States; debenture shares are substantially obligations, rather than certificates, of ownership, the form being adopted largely to give the holders a voice in the management. 'Founders'' shares usually represent a material contingent interest retained by the originators of the business, by which they obtain large ultimate gains if the enterprise is successful. 'Deferred' shares are used to represent a subordinate interest coming after the common stock.

The shares into which stock is divided vary as to the amount of interest represented; the most prevalent for railway and many business corporations is the $100 share; in Pennsylvania $50 shares are most in use; for mining companies, $10, $5 and $1 denominations are generally employed. The share certificates are negotiable by assignment, the form thereof being usually printed upon the back of the certificate; the transaction is not consummated, however, until the transfer is entered upon the books of the corporation and a new certificate issued in the name of the new owner. In order to be binding upon the corporation certificates must be signed by the proper officers and bear the corporate seal. The general character of the interest (the preference rights, for example) is expressed in the body.

In order to prevent the negotiation of counterfeits, the certificates dealt in at the Stock Exchange in New York are required to be engraved; for others, lithographed or printed forms are used.

STOCKTON, *stŏk'ton:* city, capital of San Joaquin co., Cal.; on a branch of the San Joaquin river and the Central Pacific and other railroads; 48 m. s.e. of Sacramento, 92 m. (by rail) e.-by-n. of San Francisco. The branch of the river, known as Stockton Channel, is navigable for steam and sailing vessels of 500 tons from the city to the river, 3 m., and on it large quantities of wheat are annually shipped. The city is on a plain, is regularly laid out and tastefully ornamented, is supplied with water chiefly by artesian wells, and has a delightful equable climate. It has gas and electric lights; electric street railroads; regular steamboat communication with San Francisco; 17 churches, United States post-office, Masonic Temple, new county court-house, State Asylum for the Insane; Roman Catholic convent; 2 public libraries; many public schools, Mechanics' Institute; numerous banks, and several daily, weekly and monthly periodicals. Stockton is the business center of the San Joaquin valley, and one of the most important wheat-markets in California. Its grain warehouses have combined storage capacity of more than 3,000,000 bushels. The principal industries besides handling of grain are the manufacture of flour, agricultural implements, paper, woolen goods, leather, carriages, furniture, foundry products, and soap. Stockton was laid out 1849, attained large business importance during the early mining excitement, and after the mining reaction became the center of trade for a large agricultural region. Pop. (1900) 17,506; (1910) 23,253.

STOCK'TON, Francis Richard: journalist and author: b. Philadelphia, 1834, Apr. 5; d. 1902, Apr. 20. After a high-school course, he was a draughtsman and engraver 1852; invented a double graver; and engaged in journalism, in positions successively on the Philadelphia *Post*, New York *Hearth and Home*, *Scribner's Monthly*, and *St Nicholas* magazine. His *Ting-a-Ling Stories*, for juvenile reading, were collected and published 1870; and similar stories of his in volume form have been issued frequently. Some of his short stories for adult readers have become noted, such as *A Tale of Negative Gravity;* and *The Lady or the Tiger?* the latter propounding an unanswered question of choice between love and jealousy. Many of his stories and novels have become exceedingly popular, being unsurpassed in oddity of situations and the quietest matter-of-fact way of narrating the incredible, with a humor whose charm is peculiarly his own. *The Casting Away of Mrs. Lecks and Mrs. Aleshine* (1886) details with the gravest simplicity an impossible degree of presence of mind in the heroines, who are cast into situations at once

most trying and deliciously grotesque. *The Dusantes* (1888) is its sequel. Other works are, *Rudder Grange* (1879), and its continuation *The Rudder Grangers Abroad; The Hundredth Man* (1887); *Amos Kilbright* (1888); *Personally Conducted* (1889); *The Great War Syndicate; Three Burglars; The Squirrel Inn* (1891); *The Adventures of Captain Horn* (1895); *A Story Teller's Pack* (1897); *The Associate Hermits* (1898); *A Bicycle of Cathay* (1900); *John Gayther's Garden, and the Stories Told Therein* (1902); and *The Captain's Toll-Gate* (1903).

STOCK'TON, Richard: patriot: 1730, Oct. 1—1781, Feb. 28; b. near Princeton, N. J.; great-grandson of Richard Stockton, who, before 1670, emigrated from England, and about 1680 bought 6,400 acres in New Jersey around the present site of Princeton. Stockton graduated from Princeton College 1748, studied law at Newark, was admitted to practice 1754, and soon became eminent in his profession. He went to England and Scotland 1766; induced Dr. Witherspoon to accept the presidency of Princeton College; soon after his return became a member of the executive council of New Jersey; and 1774 was made a judge of the supreme court. He suggested a compromise for the troubles with the mother country, but afterward favored resistance by the colonies; was a member of the continental congress, and signed the Declaration of Independence; was chosen chief-justice when New Jersey became a state, but declined to serve; was an inspector of the army; was taken prisoner by the British 1776, and so severely treated that his health was greatly impaired. He died at his home near Princeton.

STOCK'TON, Robert Field: naval commander: 1796-1866, Oct. 7; b. Princeton, N. J.; grandson of Richard Stockton, signer of the Declaration of Independence. Leaving Princeton College at 15 years of age, he became midshipman, and was promoted junior lieutenant 1814 for gallantry in battles of the frigate *President*. The next year he served on the *Spitfire* as first lieutenant in the Algerine war, showing intrepidity in boarding a war-vessel of the enemy with only a boat's crew. In command of the *Erie*, he was sent to the African coast to aid the Colonization Society, and secured land for the colony of Liberia; also captured vessels in the slave-trade, and a Portuguese privateer; for some of which acts he was called to account, but justified by the courts. Later, he broke up a rendezvous of pirates in the West Indies. After 1830 he gave attention to planning steam war-vessels, resulting in the completion of the *Princeton* 1844, long a model of construction here and abroad. In 1847 he finished the conquest of California with a force of about 1,500 men, more than a third of whom were sailors. Resigning from the navy 1849, he was in the U. S. senate 1851-53, successfully carrying through,

among other measures, the abolition of flogging in the navy. He was president of the Delaware & Raritan Canal Company in his latter years, and died at Princeton.

STOCK'TON, THOMAS HEWLINGS, D.D.: 1808, June 1 —1868, Oct. 9; b. Mount Holly, N. J. After studying medicine, he became a minister of the Methodist Protestant Church, preached in Maryland, removed to Philadelphia 1838 to secure greater freedom in discussing the slavery question, was for three years in Cincinnati, and 1850-56 was associate pastor of a Methodist Protestant church in Baltimore. In 1856 he became pastor of an independent church in Philadelphia, with which he remained till his death. He was chaplain of the U. S. senate 1862, and had been chaplain of the house of representatives for several years. Dr. Stockton was a very fervid and powerful preacher. He was prominent in the anti-slavery movement and in various reforms. Among his books were *Sermons for the People* (1854), and *Influence of the United States on Christendom* (1865).

STOCK'TON-ON-TEES, *-tēz:* municipal and parliamentary borough and seaport in Durham, England; 11 m. e.n.e. of Darlington, 20 m. s.s.e. of Durham; on the left bank of the Tees. The broad and handsome High street is nearly a mile in length, and from it several minor streets diverge at right angles. A new town, South Stockton, has sprung up in recent years on the right bank of the river. The town contains two churches, a Roman Catholic chapel designed by Pugin, several dissenting chapels, an athenæum, and other important edifices. The Stockton races are held here annually.—Shipbuilding, chiefly in iron, is very extensive; and blast-furnaces, foundries, engine-works, and great iron-works and potteries are in operation. Sail-cloth, ropes, linen, and diapers are manufactured; and there are breweries, corn-mills, and spinning-mills. Exports are chiefly iron and earthenware; imports are corn, timber in deals, spars, etc., and bark. The town is connected with the whole railway system of England and Scotland by the Northeastern railway and its branches, and there are two stations here. The Stockton & Darlington railway, the first in the United Kingdom for passenger traffic, was opened 1825.—At Stockton the Tees is navigable for vessels of large tonnage; by a cut, avoiding a bend of the river, the distance to the sea is shortened 3 m.; the navigation of the river has been much improved, and facilities for extensive trade provided.

Stockton suffered severely from incursions of the Scots in the early part of the 14th c., but even then it had considerable trade. It was captured for the parliament 1644, and destroyed by the roundheads 1652. At the restoration it had only 120 houses, mostly of clay. Pop. parliamentary borough (1901) 71,812.

STODDARD, *stŏd'ĕrd,* AMOS: soldier and author: 1762, Oct. 26—1813, May 11; b. Woodbury, Conn. He was in the revolutionary war from 1779 till its close; then became clerk of the supreme court of Massachusetts; afterward practiced law several years in Hallowell, Me.; was appointed captain of artillery 1798, major 1807; governor of Missouri Territory 1804-5, and deputy quartermaster 1812. He wrote *The Political Crisis,* and *Sketches, Historical and Descriptive, of Louisiana.* He was mortally wounded at the siege of Fort Meigs, Ohio.

STOD'DARD, DAVID TAPPAN: 1818, Dec. 2—1857, June 22; b. Northampton, Mass.: missionary. While at Williams College two years, he made original observations with telescopes constructed by himself. Graduated at Yale 1838, he was tutor in Marshall College, Pa.; studied at Andover Theological Seminary one year; was tutor at Yale 1840; and went as missionary of the American Board to the Nestorians 1843. His wife dying, he returned 1848, spending 3 years in missionary service in this country. In 1851 he resumed his work at Oroomiah, Persia; and there he died. He was a model missionary. He completed a *Grammar of Modern Syrian Language* 1853, published by the American Oriental Society 1855. He also wrote in that language many religious and school tracts. See Memoir by Rev. J. P. Thompson, 1858.

STODDARD, RICHARD HENRY: American poet and journalist: b. Hingham, Mass., 1825, July 2; d. New York, 1903, May 12. He went to New York when very young, and there he was employed for some time in an iron-foundry. He began, about 1848, to write in prose and verse for periodicals, and ultimately devoted himself to literature. From 1853 to 1870 he was connected with the custom house, in 1870-3 he was secretary to General McClellan, in 1860-70 was literary reviewer for the *World,* and from 1880 for the *Mail and Express* (now the *Evening Mail*). The amount of his critical work in these posts was very large. He wrote much worthy verse, lyric and narrative, of a reflective cast; patterned in the earlier period after Keats. *Abraham Lincoln,* an ode, is among his best-known efforts. Among his numerous writings are *Footprints* (1849); *Songs of Summer* (1856); *The King's Bell* (1862); *The Book of the East* (1871); *Memoir of E. A. Poe* (1875); *Poems* (1880, collected); *Life of Washington Irving* (1886); *The Lion's Cub* (1890), poems; and *Under the Evening Lamp* (1893), essays on Hogg, David Gray, Ebenezer Elliot, Edward Fitzgerald, and others. His valuable collection of autographs and manuscripts was presented by him to the New York Authors' Club, a few months before his death. Consult his *Recollections, Personal and Literary,* edited by Ripley Hitchcock, with introduction by E. C. Stedman (1903). ELIZABETH BARSTOW STODDARD, his wife, b. Mattapoisett, Mass., 1823, May 6; d. 1902, published commendable poems, and several noteworthy New

England romances: *The Morgesons* (1862); *Two Men* (1865).

STOD'DARD, SOLOMON: Congregational minister: 1643-1729, Feb. 11; b. Boston. He graduated at Harvard 1662, and was the first librarian of that institution, 1667; and for two years was chaplain of Governor Serle in the island of Barbadoes. From 1669 to his death he was pastor of the Congregational Church at Northampton, Mass., his grandson, Jonathan Edwards, becoming his colleague 1727. He published *The Doctrine of Instituted Churches* (1700), advocating the doctrine that the Lord's Supper is of converting influence, and that—somewhat as in the Church of England—all baptized persons should be admitted to it, even without religious awakening and experience, for opposition to which teaching and practice his colleague Jonathan Edwards was driven away from the Northampton church 50 years later. Stoddard published also *A Guide to Christ*, and *The Safety of Appearing in the Day of Judgment in the Righteousness of Christ.*

STODDERT, *stŏd'ĕrt*, BENJAMIN: first secretary of the United States navy: 1751-1813, Dec. 18; b. Bladensburg, Md. At the battle of Brandywine, holding the rank of major, he was wounded, and retired from the service. He was U. S. secretary of the navy 1798, May—1801, Mar., administering that office with exemplary energy. He was the trusty friend and adviser of President John Adams. In private life he was a merchant of Georgetown, D. C.

STŒCHIOLOGY, n. *stē-kĭ-ŏl'ŏ-jĭ* [Gr. *stoichei'on*, a first principle; *logos*, speech]: treatise on the elements or proximate principles which compose a body. STŒ'CHIOLOG'ICAL, a. *-lŏg'ĭ-kăl*, of or pertaining to the elementary substances.

STOESSEL, ANATOLI MIKHAILOVITCH: Russian general: b. of Swedish parents in Saint Petersburg, 1848, July 10; was educated in Paul Military School, St. Petersburg, and entered the army in 1864, serving with distinction in the Russo-Turkish war, 1877-8; was appointed colonel in 1889, major-general in 1899, commander of the Ninth East Siberian Sharpshooters' Brigade 1900, and for meritorious services against the Boxers in the same year was made a lieutenant-general. At the outbreak of the Japanese war in 1904, Feb., he was appointed commander at Port Arthur, owing to his thorough knowledge of engineering, chemistry, fortification methods, and sanitary improvements, and soon afterward commander of the entire army corps ordered to the defense of that fortress, which he surrendered to the Japanese 1905, Jan. 3. He was rewarded by Emperor Nicholas for his gallant defense of the fortress with the title of 'Aide-de-camp to the Czar.' In spite of this he was tried, and on Feb. 19, 1908, he was condemned to

death, but his punishment was commuted to 10 years' imprisonment. The charges were that he had surrendered Port Arthur before all means of defense had been exhausted; that he failed to enforce proper authority, and that he was guilty of various military misdemeanors.

STOIC, n. *stō'ĭk* [Gr. *stōĭ'kos,* pertaining to the porch —from *stŏă,* the porch, especially the porch where Zeno taught: It. *stoico;* F. *stoïque,* Stoical]: one of the sect of philosophers called *Stoics,* founded by Zeno of Citium, who taught in a porch at Athens that men should be free from passion, and be unmoved by the joys or sorrows of life (see ZENO OF CITIUM): one regulating his conduct according to the doctrines of the Stoics. STO'IC, a., or STO'ICAL, a. *-ĭ-kăl,* pertaining to the Stoics or their doctrines; unaffected by passion; unfeeling. STO'ICALLY, ad. *-lĭ.* STO'ICISM, n. *-sĭzm,* the doctrines and maxims of the Stoics; a real or pretended indifference to pleasure or pain. STO'ICALNESS, n. *-kăl-nĕs,* the state of being indifferent to pleasure or pain.—The *Stoics* were an ancient school of philosophers, and as a sect of moralists were opposed to the Epicureans in their views of human life. The Stoic system dates from the end of B.C. 4th c.: it was derived from the system of the Cynics, whose founder, Antisthenes, was a disciple of Socrates (see CYNIC, and titles there referred to). Indeed, the doctrines, but still more the manner of life, and most of all the death, of Socrates were the chief foundations of Stoic philosophy.

The founder of the system was ZENO of Citium, who lived in the last part of B.C. 4th c., and who derived his first impulse from Crates the Cynic. He opened his school in a building or porch, called the *Stoa Pœcile* ('Painted Corridor'), on the n. side of the market-place at Athens, whence the name. Zeno had for his disciple CLEANTHES, from Assos in the Troad, B.C. 300-220, whose *Hymn to Jupiter* is the only fragment of any length that has come down to us from the early Stoics, and is a remarkable production, setting forth the unity of God, His omnipotence, and His moral government. CHRYSIPPUS, from Soli in Cilicia, B.C. 280-207, followed Cleanthes, and, in his voluminous writings, both defended and modified the Stoical creed. These three represent the first period of the system, about B.C. 304-205.—The second period, B.C. 205-50, embraces its general promulgation, and its introduction to the Romans. Chrysippus was succeeded by ZENO of Sidon, and DIOGENES of Babylon; then followed ANTIPATER of Tarsus, who taught PANÆTIUS of Rhodes (died B.C. 112), who taught POSIDONIUS of Apamea in Syria. (Two philosophers besides Chrysippus are mentioned from the native province of the apostle Paul—Athenodorus, from Cana in Cilicia; and Archedemus, from Tarsus, the apostle's birthplace. Almost all the first Stoics were of Asiatic birth; and the system itself is undeniably more akin to the oriental

mind than to the Greek.) Posidonius was acquainted with Marius and Pompey, and taught Cicero; but the moral treatise of Cicero, *De Officiis*, is derived from a work of Panætius.—The third period of Stoicism, after B.C. 50, is Roman. In this period we have Cato the Younger, who invited to his house the philosopher Athenodorus; and, under the empire, the three Stoic philosophers whose writings have come down to us—SENECA, B.C. 6—A.D. 65; EPICTETUS, A.D. 60-140, who began life as a slave, and Emperor MARCUS AURELIUS ANTONINUS, 121-180. Stoicism prevailed widely in the Roman world, though not to the exclusion of Epicurean views. As a philosophy in general, Stoicism was a system of materialism, but of dynamic materialism, tracing all things back to Force; and a system of monism or of pantheism. Its philosophical tendency was to reduce all existences to abstractions.

The leading Stoical doctrines are given in certain phrases or expressions, as 'Life according to Nature,' the ideal 'Wise Man,' 'Apathy' or equanimity of mind, the power of the 'Will,' the worship of 'Duty,' the constant 'Advance' in virtue, etc. But perspicuity will be best gained by considering the *Moral* system under four heads—the Theology; the Psychology or theory of mind; the theory of the Good or human happiness; and the scheme of Virtue or Duty.

I. The Theological doctrines of the Stoics comprehended their system of the Universe, and of man's position in it. They held that the Universe is governed by one good and wise God, together with inferior or subordinate deities. God exercises a moral government; under it the good are happy, while misfortunes happen to the wicked. According to Epictetus, God is the father of men; Antoninus exults in the beautiful arrangement of all things. They did not admit that the Deity intermeddled in the smaller affairs; they allowed that omens and oracles might be accepted as signs of the foreordained arrangement of God. They held this foreordination even to the length of fatalism, and made the same replies as have been given in modern times, to the difficulty of reconciling it with Free will, which in their system was unusually prominent. As to the existence of evil, they offered explanations such as the following: God is the author of all things except wickedness; the very nature of good supposes its contrast evil, and the two are inseparable, like light and dark, which may be called the argument from Relativity; in the enormous extent of the Universe, some things must be neglected; when evil happens to the good, it is not as a punishment, but as connected with a different dispensation; parts of the world may be presided over by evil demons; what we call evil may not be evil.

Like most other ancient schools, the Stoic held God to be corporeal like man; Body is the only substance; noth-

ing incorporeal could act on what is corporeal; the First Cause of all, God or Zeus, is the primeval fire, emanating from which is the soul of man in the form of a warm ether.

It is for human beings to recognize the Universe as governed by universal Law, and not only to raise their minds to the comprehension of it, but to enter into the views of the Creator, who must regard all interests equally; we are to be, as it were, in league with him, to merge self in the universal Order, to think only of that, and its welfare. As two is greater than one, the interests of the whole world are infinitely greater than the interests of any single being, and no one should be satisfied with a regard to anything less than the whole. By this elevation of view, we are necessarily raised far above the consideration of the petty events befalling ourselves. The grand effort of human reason is thus to rise to the abstraction or totality of entire Nature; 'no ethical subject,' says Chrysippus, 'could be rightly approached except from the preconsideration of entire Nature, and the ordering of the whole.

As to Immortality, the Stoic generally held the theory of the *absorption* of the individual soul at death into the divine essence; but their doctrine of advance and aspiration is what has in all times been the main natural argument for the immortality of the soul.

In arguing for the existence of Divine power and government, they employed what has been called the argument from Design, which is as old as Socrates. Man is conscious that he is himself an intellectual or spiritual power from which, by analogy, he is led to believe that a greater power pervades the universe, as intellect pervades humanity.

II. The Constitution of the Mind. We have bodies like animals, but reason or intelligence like the gods. Animals have instinctive principles of action; man alone has a rational, intelligent soul. According to Antoninus, we come into contact with Deity by our intellectual part, and our highest life is thus the divine life.

But the most important Stoical doctrine respecting the nature of man is the recognition of Reason as a superior power or faculty that subordinates all the rest —the governing intelligence. (Very nearly the same phraseology is used by Bishop Butler in setting forth the supremacy of Conscience.) This, however, is not a mere intellectual principle, but an active force, uniting intellect and will. The bodily sensibilities are opposed to this higher Reason and Will, which, however, is strong enough to control them. Another way of expressing the same view was the power of the Mind over the Body, set forth by Epictetus in exaggerated form.

In order to maintain their contrast with the Epicureans, the Stoics said that pleasure and pain are not

principles of Nature; by which they must have meant that humanity is not in fact, at least exclusively, governed by these, and that, in the regenerated man, they are not governing principles at all. Now, it is true, and a truth important for many practical purposes, that we are sometimes impelled to action without reference to our pleasures and pains, our habits often exemplify this state; it is still better shown in what are called 'fixed ideas,' as in involuntary imitation and sympathy. But these are exceptions; and any system that sets itself against the main fact, that pleasure and pain are among the great moving forces of mankind, must somewhere contradict itself.

In Seneca, we find something closely approaching the Christian doctrine of the corruption of human nature. The littleness of humanity was a favorite theme of Antoninus, and naturally followed from the Stoical mode of contemplating the Universe at large.

The doctrine called the Freedom of Will may be said to have originated with the Stoic, though with them it was chiefly a rhetorical mode of expressing the dignity of the Wise Man, and his power of rising superior to circumstances.

To prepare the way for the Stoical precepts, Epictetus distinguished between things in our power and things not in our power. The things in our power are our opinions and notions about objects, and all our affections, desires, and aversions; the things not in our power are our bodies, wealth, honor, rank, authority, etc., and their opposites. The application is this: wealth and high rank may not be in our power, but we have the power to form an *idea* of these—namely, that they are unimportant, whence the want of them will not grieve us. A still more pointed application is to death, whose force is entirely in the idea.

III. The Stoical Theory of Happiness, or rather of the Good, which with them was not identified with happiness. They began by asserting that happiness is not necessary, and may be dispensed with, and that pain is no evil, which, however, if followed consistently, would dispense with all morality and all human endeavor. Substantially and practically, they held that pains are an evil, but, by a proper discipline, may be triumphed over. They disallowed the direct and ostensible pursuit of pleasure as an end (the point of view of Epicurus), but allured their followers partly by promising them the victory over pain, partly by certain enjoyments of an elevated cast that grew out of their plan of life.

Pain of every kind, whether from the casualties of existence, or from the severity of the Stoical virtues, was to be met by a discipline of endurance, a hardening process, which, if persisted in, would succeed in reducing the mind to a state of Apathy or indifference. A great

many reflections were suggested in aid of this education. The influence of exercise and repetition in adapting the system to any new function, was illustrated by the Olympian combatants, and by the Lacedæmonian youth who endured scourging without complaint. Great stress was laid on the instability of pleasure, and the constant liability to accidents; whence we should always be anticipating and adapting ourselves to the worst that could happen, so as never to be in a state where anything could ruffle the mind. It was pointed out how much might still be made of the worst circumstances—poverty, banishment, public odium, sickness, old age.

It has often been remarked that such a discipline of endurance was peculiarly suited to the unsettled condition of the world at the time, when any man, besides the ordinary evils of life, might in a moment be sent into exile, or sold into slavery. Moreover, it is a discipline adapted to a certain class of dispositions existing in all ages—the men that prefer above all things 'equanimity' of mind, and would rather dispense with great occasional pleasures than risk their state of habitual composure.

Next to the discipline of endurance, we must rank the complacent sentiment of Pride, which the Stoic might justly feel in his conquest of himself, and in his lofty independence and superiority to the casualties of life. The pride of the Cynic, the Stoic's predecessor, was prominent and offensive, showing itself in scurrility and contempt toward everybody else; the Stoical pride was a refinement on this, but was still a comfortable sentiment of superiority, which helped to compensate for the surrender of indulgences. It was usual to bestow extravagant laudation on the 'Wise Man;' and every Stoic could take this home to the extent that he considered himself as approaching that great ideal.

The last and most elevated form of Stoical happiness was the satisfaction of contemplating the Universe and God. Epictetus says that we can discern the providence that rules the world, if we possess two things—the power of seeing all that happens with respect to each thing, and a grateful disposition. The work of Antoninus is full of studies of Nature in the devout spirit of 'passing from Nature to Nature's God;' he is never weary of expressing his thorough contentment with the course of natural events, and his sense of the beauties and fitness of everything. Old age has its grace, and death is the becoming termination. This high strain of exulting contemplation reconciled him to that complete submission to whatever might befall, which was the essential feature of the 'Life according to Nature.'

IV. The Stoical theory of Virtue is implicated in their ideas of the Good, now described.

The fountain of all virtue is manifestly the life ac-

cording to nature, as being the life of subordination of self to more general interests—to family, country, mankind, the universe. If a man is prepared to consider himself absolutely nothing in comparison with the universal interest, and to regard it as the sole end of life, he has embraced an ideal of virtue of the loftiest order. Accordingly, the Stoics were the first to preach what is called 'Cosmopolitanism.' They cherished the conception of the universal brotherhood of mankind, and included in their regards even the brute creation. They said: 'There is no difference between Greeks and Barbarians; the world is our city.' Seneca urges kindness to slaves, for 'are they not men like ourselves, breathing the same air, living and dying like ourselves?'

The Epicureans declined, as much as possible, interference in public affairs, but the Stoical philosophers all urged men to the duties of active citizenship. Although there had been many good and noble men among the pagans, yet positive beneficence had not been preached as a virtue prior to the Stoics. They adopted the four Cardinal Virtues (Wisdom, or the Knowledge of Good and Evil; Justice; Fortitude; Temperance) as part of their plan of the virtuous life, the life according to nature. Justice, as the social virtue, was placed above all the rest. But most interesting to us are the indications of the idea of Beneficence. Epictetus is earnest in his exhortations to forgiveness of injuries. Antoninus often enforces the same virtue, and suggests considerations in aid of the practice of it; he contends as strongly as Butler and Hume for the existence of a principle of pure, that is, unselfish benevolence in the mind, in other words, that we are made to advance each other's happiness.

There is also in the Stoical system a recognition of duties of God, and of morality as based on piety. Not only are all men brethren, but also the 'children of one Father.'

The idea of Duty was of Stoical origin, fostered and developed by the Roman spirit and legislation. It was a great point with the Stoic to be conscious of 'advance,' or improvement. By self-examination, he kept himself constantly acquainted with his moral state, and it was both his duty and his satisfaction to be approaching the ideal of the perfect man. When renouncing the position of 'wise,' he yet claimed to be advancing. This idea, familiar to the modern world, was unknown to the ancients before the Stoics. It is very illustrative of the unguarded points and contradictions of Stoicism, that contentment and apathy were not to permit grief even for the loss of friends. Seneca, on one occasion, admits that he was betrayed by human weakness on this point. On strict Stoical principles, we ought to treat the afflictions and the death of others with the same frigid

indifference as our own; for why should a man feel for a second person *more* than he ought to feel for himself, as a mere unit in the infinitude of the Universe? This is the contradiction inseparable from any system that begins by abjuring happiness from any part in the proper aim of life. We may be allowed to regard our own happiness as of no importance, but if we apply the same measure to happiness in general, we are bereft of all motives to benevolence; and virtue, instead of being set on a loftier pinnacle, is left without any foundation.

The Stoical system has largely tinctured modern ages, in spite of its severity. It has always had a charm as an ideal, even when men were conscious of not realizing it. A qualified form of subordination of self to the general welfare belongs to all the higher modern theories of virtue; this, however, is in no sense original with Stoicism.

The chief ancient authorities on the Stoic are the writings of Epictetus, Marcus Antoninus, and Seneca, themselves Stoical philosophers; together with notices occurring in Cicero, Plutarch, Sextus Empiricus, Diogenes Laertius, and Stobæus. See Zeller, *Presocratic Philosophy; Socrates and the Socratic Schools;* Burnet, *Greek Philosophy,* and Gomperz, *Greek Thinkers.*

STOKE, v. *stōk* [from STOCK, which see: Dut. *stoken,* to make a fire: OF. *estoquer,* to stab or thrust]: to poke; to stir up; to supply a furnace with fuel. STO'-KING, imp.; N. the proper management of a fire connected with a steam-engine. STOKED, pp. *stōkd.* STO'KER, n. *-kėr,* one who looks after the fire of a locomotive or steam-engine.

STOKES, *stōks,* GEORGE GABRIEL, LL.D.: great mathematician and natural philosopher: b. 1819, at Skreen, county Sligo, Ireland; d. 1903. After studying at the Bristol College, he entered Pembroke College, Cambridge, 1837; graduated 1841, as senior wrangler, and first Smith's prizeman; became fellow of Pembroke in the same year; and was elected 1849 to fill, as one of the worthiest of Newton's successors, the Lucasian chair of mathematics in Cambridge. In 1854 he was appointed sec. to the Royal Society. He is best known by his discovery of Fluorescence. His paper *On the Change of the Refrangibility of Light* is printed in the *Philosophical Transactions* for 1852-3. To mathematicians and natural philosophers, Stokes is known by a number of admirable papers in the *Cambridge Philosophical Transactions,* the *Cambridge and Dublin Mathematical Journal,* and the *Philosophical Magazine.* Notable publications by Stokes are: *Report on Double Refraction* to the British Association in 1862, *Lectures on Solar Physics* (published in *Nature,* 1881), the *Burnett Lectures on Light* (1884), and a collected issue of his *Mathematical and Physical Papers* (1880-83), which had

long been wished for. He was president of the British Association 1869.

STOKES, WHITLEY: Irish Celtic scholar: b. Dublin 1830, Feb. 28. He was educated at Trinity College, Dublin, and called to the bar at the Inner Temple in 1855. He went to India in 1862, and became successively secretary to the governor-general's legislative council and to the legislative department of the government of India. In 1877-82 he was law member of career in India drafted the greater part of the present the governor-general's council, and during his official codes of civil and criminal procedure as well as numerous acts relating to property, trusts, etc. In 1879 he was president of the Indian Law Commission. In 1868 he proposed a scheme for collecting and cataloguing the Sanskrit manuscripts preserved in India. His published works include those treating of legal, and those dealing with Celtic subjects. The former comprise *Treatise on the Liens of Legal Practitioners* (1860); *On Powers of Attorney* (1861); *Hindu Law Books* (1865); *The Older Statutes in Force in India, with Notes* (1874); and *The Anglo-Indian Codes* (1887-8; supplements, 1889-91); etc. Among his Celtic works may be named *Irish Glosses* (1860); *Three Irish Glossaries* (1862); *The Play of the Sacrament* (1862); *The Passion, a Middle Cornish Poem* (1862); *The Creation of the World, a Cornish Mystery* (1863); *Three Middle Irish Homilies* (1871); *The Tripartite Life of St. Patrick* (1887), in the Rolls Series; *Lives of Saints from the Book of Lismore* (1889); *Urkeltischer Sprachschatz* (1894), with Bezzenberger; *The Annals of Tigernach* (1897); *The Eulogy of St. Columba* (1899). He is joint-editor of *Irische Texte* and of the *Archiv. für Celtische Lexikographie.*

STOKE-UPON-TRENT: municipality, parliamentary borough, and manufacturing town in Staffordshire, 145 m. from London by the London and Northwestern railway. The 'district' of Stoke-Upon-Trent consists of the parish of Stoke-Upon-Trent, familiarly named the 'Potteries,' and contains the towns Burslem, Hanley, Lane-End (with Longton), Stoke, and Tunstal Court. The town of Stoke is regularly built. Its church is an edifice in modern Gothic. The earthenware manufactures of the parish of Stoke are carried on in about 200 factories. In the vicinity are coal-mines. Pop. municipal borough (1881) 19,263; enlarged and adjusted (1901) 30,458.

STOLBERG, *stōl'bĕrch*, CHRISTIAN, Count VON: poet: 1748, Oct. 15—1821, Jan. 18; b. Hamburg; from one of the oldest German families. He studied at Göttingen. In 1777 he married Luise, Countess of Reventlow; and after 1800 lived in retirement on his estate of Windebye, near Eckernförde in Slesvig, where he died. As a poet,

he was inferior in genius to his younger brother; but his scenes of family life have been much admired for their sincere and ardent feeling. His principal works are *Gedichte* (Leip. 1779); *Gedichte aus dem Griechischen* (Hamb. 1782); *Schauspiele mit Chören* (Leip. 1787); and *Vaterländische Gedichte* (with his brother; Hamb. 1815).

STOL'BERG, FRIEDRICH-LEOPOLD, Count VON: poet: 1750, Nov. 7—1819, Dec. 5; b. Bramstedt; younger brother of Count Christian von Stolberg. He studied at Halle and Göttingen, and after a visit to Switzerland and Italy, making the acquaintance of Goethe at Frankfurt, and of Lavater at Zürich, he became, 1777, minister-plenipotentiary of the episcopal Prince of Lübeck at the court of Denmark. Stolberg filled other official situations; but becoming a convert to Rom. Catholicism, he resigned all his employments, and lived mainly in the society of his co-religionists. The causes that led him to this step, which lost him many old and dear friends, were partly the theological strifes between the rationalists and orthodox Lutherans in Holstein—the country where he mostly resided, and partly his study of the controversial works of Rom. Cath. writers during a second visit to Italy 1790-1. He died at Sondermühlen, near Osnabrück. Stolberg is a superior poet to his elder brother: there is greater boldness in his ideas and imagery, and wonderful facility in versification. Specimens of all sorts of poetry from him are in *Werke der Brüder Stolberg* (22 vols., Hamp. 1821-26). See *Friedr. Leopold, Graf zu Stolberg*, by Nicolovius (Mainz 1846).

STOLE, v. *stōl*, pt., STOLEN, v. *stōl'n*, pp., of STEAL.

STOLE, n. *stōl* [L. *stola;* Gr. *stolē*, a long, feminine upper garment—from *stellein*, to equip, to set in order: It. *stola*, a stole]: long narrow scarf of silk or stuff, fringed at the ends, and often richly embroidered, worn by Rom. Cath. and Anglican priests—and with some modification, in the Greek Church also—over the surplice, made to pass across each shoulder, and hang down in front to about the knees—that of a deacon is passed over the left shoulder, crosses the back and breast like a sash, and hangs by its two ends down the right side: in *OE.*, a long vest. The present priestly Stole seems the traditionary representative of the embroidered border of the *orarium* in the Rom. Cath. Church. It is used in some cases also as a symbol of jurisdiction; in which sense it is worn constantly by the pope, even when not officiating; and in Italy and other Rom. Cath. countries, the parish priest, after he has administered extreme unction to a sick person, *leaves the stole upon the foot of the bed, not to be withdrawn until the death or recovery of the invalid.* In the English Church the use of the Stole appears to rest only on ancient custom: it is usually of black silk, fringed at the ends, with some-

times crosses embroidered. STOLED, a. *stōld,* wearing a stole or long robe. GROOM OF THE STOLE, in the *court of a sovereign,* the first lord of the bedchamber, whose original duty was to put the king's shirt on in the morning; an officer who has charge of the king's wardrobe.

STOLE, n. *stōl,* or STOLON, n. *stō'lŏn* [L. *stolo,* a twig or shoot springing from the stock of a tree]: in *bot.,* a lax trailing branch given off at the summit of the root and taking root at intervals; in *zool.,* one of the connecting processes of sarcode in *Foraminifera.* STOLONIFEROUS, a. *stō'lŏn-ĭf'er-ŭs* [L. *fero,* I produce]: producing suckers, having creeping runners.

STOLEN GOODS, PURCHASE OF: in law in the United States (differing in some respects from that in England), an act giving no more title or right than the thief had; i.e., the owner may take the goods wherever he finds them. The only exception to this rule is that money or negotiable instruments may become the property of one who buys them in good faith, even from a thief; the necessity of this exception is in the fact that without it, an incalculable risk would attach to all commercial and financial transactions, and business would be ruinously hampered.—As to giving reward for recovery of goods stolen, see REWARD, in Law.

STOLID, a. *stŏl'ĭd* [L. *stolĭdus,* dull, senseless: It. *stolido,* stolid: Gael. *stol,* to calm, to settle; *stolda,* sedate]: dull; heavy; foolish; calm and unmoved; stupid. STOLIDITY, n. *stō-lĭd'ĭ-tĭ,* dulness of intellect; stupidity; also STOL'IDNESS.

STOLON. See STOLE 3.

STOLP, *stōlp,* or STOLPE, *stōl'pĕh:* garrisoned town of Prussia, chief town of a circle in the province of Pommern, on the river Stolp, about 15 m. from its mouth, 40 m. n.e. of Kōslin. Stolp is composed of an old and new town, with four suburbs; has a castle, 4 churches (one the *Marienkirche,* built 1311, has a lofty tower), a hospital for invalids, amber and other manufactures, and active general trade. At the mouth of the river is Stolpmünde (pop. 1,118), the port of Stolp.—Pop. (1901) 27,272.

STOMACACE, n. *stō-măk'ă-sē* [Gr. *stoma,* the mouth; *kakos,* bad]: a fetid state of the breath and mouth.

STOMACH, n. *stŭm'ăk* [L. *stomăchus;* Gr. *stomăchŏs,* the alimentary canal—from Gr. *stoma,* a mouth: OF. *estomach;* F. *estomac,* the stomach]: principal organ of digestion (see below): desire of food caused by hunger; appetite; liking; inclination; in *OE.,* anger; violence of temper; sullenness; resentment; stubbornness; haughtiness; pride: V. to brook; to resent; to bear without open resentment. STOM'ACHING, imp.: N. in *OE.,* resentment. STOM'ACHED, pp. *-ăkt,* borne without open resentment: ADJ. filled with resentment. STOM'ACHLESS, a. *-lĕs,* with-

out appetite. STOMACH-PUMP, small pump in the form of a syringe, with flexible tube introduced through the œsophagus, for drawing off poisons or injurious liquids from the stomach, or for injecting liquids into the stomach for nourishment, etc. STOM'ACHER, n. *-ă-kĕr*, an ornamental covering worn over the breast by women. STOMACHIC, n. *stō-măk'ĭk*, a medicine or cordial which gives tone to and strengthens the stomach. STOMACH'IC, a., or STOMACH'ICAL, a. *-ĭ-kăl*, pertaining to the stomach; that strengthens the stomach.

STOMACH, DISEASES OF THE: *Physiology of the Gastric Digestion.*—Many of the older authors, beginning with the American physiologist, Wm. Beaumont, believe that the mechanical irritation of the foods cause the gastric secretion, but the experiments in Pawlow's laboratory, in the Institute for Experimental Medicine, St. Petersburg, have proved the fallacy of this view. In the first place, if the secretion were due to simple mechanical irritation, there is no reason why irritation with the point of a glass rod, with a feather, or with sand placed in the stomach, should not cause the secretion also. The mistake of the older experimenters, according to Pawlow, grew out of the fact that they ignored the so-called psychic secretion—a secretion which can be set up by the mere sight or smell of food, or even a very intense feeling of hunger. If the esophagus of a dog is cut, and its end sewed to the edges of the abdominal wound, or allowed to open above the sternum in the neck, and at the same time a gastric fistula is established, pieces of meat which are fed to the dog after recovery from these operations, will not reach the stomach, but fall out of the upper end of the fistula leading into the esophagus. Nevertheless in five or six minutes after the dog has swallowed the food, which never reaches the stomach, gastric juice begins to be secreted, running from the gastric cannula first in drops and afterward in a continuous stream. If the dog be offered meat without receiving it, the gastric secretion will also appear, though not so plentifully as when the dog is actually allowed to eat the meat. A further interesting phenomenon observed in these dogs was that no secretion following the swallowing of indigestible substances like small stones. These experiments furthermore elicited the astounding fact that for every kind of food a definite gastric secretion is formed of specific composition. We can say that the stomach provides a certain chemical composition of gastric juice to meet each case. We must therefore conclude that the mucous membrane of the stomach is capable of distinguishing between the varieties and classes of food that come in contact with it, much as the skin recognized mechanical, chemical, thermic, and electrical stimulation. The question might be asked, 'What is the object of this psychic secretion?' for Pawlow has clearly established the existence of two

kinds of gastric secretion, the chemical and the psychic. This question applied to the human physiology would be the same as inquiring 'What is the object of appetite?' The answer is that under the influence of the psychic secretion a gastric juice is furnished which is much more effective than that which is secreted under purely chemical stimulation by the food, i.e., when food is taken without any special appetite. Furthermore, under the influence of psychic secretion, foods which otherwise would not stimulate the gastric mucosa to secretion become converted by the already present psychic secretion into something else which constitutes a further stimulant to the secretion of gastric juice. For instance, if a solution of albumin be introduced into the stomach of a dog, upon which a Pawlow operation has been performed (i.e., splitting off part of the stomach with all the vessels and nerves intact, and making this second smaller stomach communicate with the external abdominal wall, but not with the general cavity of the large stomach from which it is dissected), there will be no secretion. But if the psychic secretion is set up by some other means, before the albumin is placed in the large stomach—for instance, by waving a piece of meat before the dog's eyes—then following the introduction of albumin, a secretion will be found in the small stomach which is greater in amount than the psychic secretion alone, or when albumin is given alone. It is evident that while albumin in itself does not excite secretion, the products of albumin do cause this secretion. The same is true of pieces of bread which when placed in the large stomach through the fistula will not promote secretion, but if the dog is allowed to chew and swallow the bread, secretion commences and continues for several hours. Psychic secretion, therefore, is a preparatory secretion transforming substances which would otherwise not stimulate the stomach, into such conditions which can accomplish the stimulation. The fact that bread will cause a secretion when chewed and swallowed and not when placed directly in the stomach through the fistula, may be interpreted (as by Pawlow and Peter Borisoff) as proving the secretion of a gastric juice under psychic influence; but, as I shall show presently, it may be due to a special internal secretion of the salivary glands that stimulates gastric secretion.

One of the first truths which the seeker for information must try to understand, is this: the various juices which bring about the transformation of the food are not secreted under a simple mechanical stimulation, but they are controlled by a beautiful chemical and nervous mechanism. These are spoken of as the nervous control of gastric secretion and the chemical coördination. With the psychic secretion of gastric juice, we are already familiar. In this no food whatever enters the stomach; an impression is made on the mind through the sense

of smell or sight, which is transmitted to the secretory cells of the stomach through the vagus nerve. During normal digestion this probably occurs to a certain extent but this secretion does not account for the whole of the gastric juice that is secreted as a result of a meal. If both vagus nerves are divided in an animal it is found that the introduction of meat into the stomach is followed after a period of twenty to forty minutes by a secretion of gastric juice. Now this cannot be a psychic secretion, nor can it be under nervous control, for the division of the vagus and splanchnic nerves severs every connection of the stomach with the brain. Gastric juice secreted in response to a normal meal really consists of two parts. *First,* a large amount of secretion which begins within five minutes of the taking of food and is determined and controlled by a reflex nervous mechanism described above. *Second,* a subsequent portion which is excited by the presence of food in the stomach. Edkins has shown that during digestion a chemical substance is formed within the mucosa of the pyloric end of the stomach, which is absorbed into the blood and then stimulates the secretory cells of the rest of the stomach to active secretion. In this instance the chemical substance which stimulates the peptic glands to further secretion is developed in the mucosa of the pyloric end of the stomach. There are other chemical substances which can stimulate gastric secretion which need not be formed in the mucosa of the pyloric end of the stomach (the antrum), but which are already contained in the food. The substance which Edkins first discovered he called 'gastrine'; the substances which are contained in the food which stimulate gastric secretion were called by Schiff 'peptogenes,' but the best name to adopt for such substances is that first suggested by E. H. Starling, of London, namely the term 'hormones,' from the Greek word ὁρμάα, meaning to arouse, to excite or to stimulate. All chemical substances that stimulate any kind of secretion under physiological conditions can be classed as hormones. We have learnt to know now three mechanisms that control gastric secretion: (1) The psychic of purely nervous secretion; (2) the secretion by hormones in the pyloric end of the stomach; (3) secretion obtained by hormones in the food; but there is also a fourth mechanism of secretion which reveals an intensely interesting chemical coördination between the secretion of the salivary glands and the secretion of the stomach.

Up to the year of 1907 it was believed that the salivary glands produced only one secretion, namely, the saliva, which is poured into the mouth to facilitate swallowing, which contains a ferment, ptyalin, and which converts starches into sugar; but in that year J. C. Hemmeter published his experimental and clinical investigations proving conclusively that the salivary glands form also an internal secretion which is not poured out into the

mouth through the salivary ducts, but which passes into the blood and on reaching the stomach causes a secretion of gastric juice. When the salivary glands were removed from dogs the gastric secretion gradually became less, and within a week after the excision of the salivary glands very little gastric juice was formed in their stomachs. As we know from the experiments of Edkins already quoted there is a secretory hormone formed within the mucous membrane in the pyloric end of the stomach, the fact that the gastric secretion ceases after the removal of the salivary glands indicates that the pyloric hormone of Edkins either depends for its formation upon previous stimulation by the salivary secretion of Hemmeter, or upon previous psychic secretion. In human beings in whom the salivary glands are destroyed by disease, a condition known as 'Mikulicz' disease,' Hemmeter discovered that the gastric secretion was lost, but that it was resumed again and became normal when Mikulicz' disease was cured. He also prepared an extract from the salivary glands containing the stimulating property. When this substance was injected into the circulation of dogs who had lost their power of forming gastric juice as a result of the removal of the salivary glands, the injected salivary extract brought about a partial resumption of the secretion of gastric juice. This demonstration of the dependence of gastric secretion upon internal secretion formed by the salivary glands is a proof of the admirable correlation and chemical co-ordination between the function of the salivary glands and the function of the stomach. In the article on Diseases of the Intestines, the writer has described a similar correlation between the function of the stomach and the function of the pancreas and upper parts of the intestines, and Frouin has shown that it is possible to stimulate the secretion of the intestinal juice in the middle part of the ileum by intravenous injection of intestinal juice gained from the duodenum or by extracts made from mucous membrane of the upper part of the intestine. The teleological significance of such a chemical mechanism is clear. A certain constituent of the intestinal juice which is formed under the influence of the food is absorbed into the blood circulation (similar to the formation and action of the gastric hormone of Edkins) and then stimulates the secretion of intestinal juice in a part of the mucous membrane further down in the intestinal canal. Thus any part of the alimentary tract is normally always prepared for the reception and digestion of the food mass, actually before the food gets there. To recapitulate: the digestion in the mouth meets with already formed saliva, for the smell, sight, and taste of food start up a secretion of saliva. The same psychic secretion occurs in the stomach as a primary phase of gastric digestion, but the secondary phase of the secretion of the stomach depends upon the stimula-

tion by three, perhaps four, chemical substances: (1) the salivary hormone of Hemmeter; (2) the pyloric hormone or gastrine of Edkins; (3) the hormones or peptogenes contained in the food; (4) the splenic hormone of Tarulli and Pascucci.

The pancreatic and duodenal secretions and the mechanism controlling the secretion of bile are described in the article on the Diseases of the Intestines. There it will be seen that the secretions are already in the duodenum before the food reaches it. The preparation of the intestines further down has already been described in speaking of the work of Frouin. Thus one part of the alimentary tract depends upon work and hormones of the preceding portion for the normal performance of its work.

In the following a brief description of the *organic and functional diseases of the stomach* will be given. First, *organic diseases,* by which term we mean those diseases which are associated with a demonstrable change in the anatomical structure of the stomach. These structural alterations are frequently visible to the naked eye, but certainly can be demonstrated by the microscope. The principal forms of these organic diseases are: 1, acute and chronic gastritis; 2, ulcer of the stomach, fissures and erosions; 3, cancer of the stomach; 4, dilatation of the stomach; 5, displacements or gastroptosis. Secondly, the *functional diseases* of the stomach are usually designated as *neuroses.* By this we mean diseases which are not associated with any demonstrable changes of the stomach. The term 'neuroses' indicates that these diseases are in some way brought about by the action of morbid nerve function. As there are principally three functions of the stomach, (1) sensation, (2) motor function or peristalsis, and (3) secretion, we may have neuroses of these three types, namely, sensory, motor, and secretory neuroses. But it must be borne in mind that no hard and fast line can be drawn between the organic and nervous diseases of the stomach. There are organic diseases of the stomach which are regularly associated with the signs and symptoms of a neurosis, in other words, combined organic and neurotic diseases may exist in a patient. Enteroptosis or displacements of the abdominal viscera is always associated with nervous symptoms. In fact, one may say that with enteroptosis there is a congenital infirmity of the entire nervous system. The cardinal point to decide in studying a patient with a disease of the stomach is whether it is an organic or functional disease, because the entire treatment depends upon this decision. Organic stomach and intestinal diseases are as a rule local and therefore the treatment is largely local, but functional, nervous, or reflex diseases of the stomach and intestines are merely partial phenomena of other constitutional diseases or diseases of other organs. They cannot be treated locally,

therefore, but must be treated on the basis of the fundamental disease of which they are merely a secondary consequence. It often happens in neuroses of the stomach that the local symptoms restricted to the stomach itself, which may not be diseased at all, are so intense as to divert the attention of the examiner away from the fundamental disease which is really in some other organ. Two-thirds of all chronic diseases of the stomach belong to the type of the neuroses or functional diseases. This alone is sufficient to emphasize how important this class of diseases is.

The examination of a stomach patient might be considered under three headings: (1) recording the history of the patient, especially the previous history or the Anamnesis, with all the subjective symptoms; (2) the physical method of examinations by palpation, percussion, and inspection; (3) the chemical and microscopical examination of the test of meals.

That diseases of the stomach are on the increase in the United States is certain, and the causes are to be sought in the strenuosity of the Americans. Their incorrigible tendency to overdo things mentally and physically, not enough rest or recreation, defective social influences, poor nutrition, insanitary dwellings, and cares concerning the daily bread among the poor, on the one hand, and enervating excesses in wine and other alcoholic beverages and psychic insults among the well-to-do. The power of these influences in causing diseases of the stomach is very great, especially in our country, where the art of cooking is still not sufficiently honored in public instruction.

Acute Gastritis.—Acute catarrh or inflammation of the stomach is caused generally by overloading of the stomach with indigestible articles of diet or of foods that have undergone decomposition. In some rare instances it is due to some micro-organism which has gained access to the stomach. The disease has sometimes been called gastric fever. In summer, acute gastritis is most frequently caused by overloading the stomach with fruit or salads in combination with the abuse of cold drinks, especially beer.

The symptoms are indigestion, nausea, vomiting, feebleness, loss of appetite, and diarrhea. It often begins with a chill followed by fever. There is an *acute dyspepsia* which occurs without fever and diarrhea in anemic and neurasthenic individuals. The only symptoms are pressure in the stomach, fullness, and loss of appetite. The treatment consists in evacuating the stomach, either by the stomach tube or by an emetic. Medicines are rarely needed, but fasting must be enjoined for two days, and when the food is resumed only thin soups of rice or farina in bouillon, and very soft-boiled eggs are permissible at first.

Chronic Gastritis, or Chronic Catarrh of the Stomach.

—This is caused by abuse of alcohol and tobacco, abuse of laxatives and purgatives, imperfect teeth and defective chewing, hasty eating and bolting of the food, improper diet. Chronic gastritis may be primary or secondary. The primary form is brought about by direct action of the harmful agents on the stomach itself. The secondary chronic gastritis occurs as an accompaniment of other diseases of the stomach or of diseases of other organs. Thus we may have secondary chronic gastritis in association with cancer of the stomach and with obstruction of the pylorus, and we may have it as a secondary disease consequent upon heart diseases and upon diseases of the liver, kidney, and other organs. Chronic gastritis cannot be recognized without chemical analysis of test-meals drawn by the stomach tube. This is unavoidable for the treatment, because the chemical analysis in different cases may reveal diagonally opposite derangements of secretion. For instance, we may have excess of hydrochloric acid (gastritis hyperacida) or entire absence of hydrochloric acid (gastritis anacida) which would naturally call for widely different treatment. But there are also other important differences between the different forms of chronic gastritis, which can only be found out by chemical analysis of the stomach contents, a procedure which is unavoidable for the correct diagnosis and treatment of this disease. The disease naturally varies also according to the length of time it has existed, for if neglected chronic gastritis may continue on until the entire structure of the stomach is destroyed.

The subjective symptoms are debility, loss of appetite, perverted tastes, oppression, fullness and distention in the stomach, especially after foods that require a sound digestion; after soups and other liquids these symptoms are not present; it usually comes after beef, hard bread, smoked meats, hard-boiled eggs, and pieces of potato have been eaten. Actual pain and vomiting are not frequent symptoms. The objective symptoms that are of importance can be ascertained only by analysis of test-meals. Whenever there is chronic diarrhea it is absolutely necessary to examine the stomach contents, even if the patients have no stomach symptoms.

As there are various types of chronic gastritis which must be treated differently, and must even have a different diet, it will not be practical or expedient to give the treatment in detail. Without a knowledge of test-meals or examinations of the stools, which require a good deal of technical training, it is impossible to have a correct diagnosis or treatment. Suffice it to say that the treatment may be (1) dietetic; (2) hygienic; (3) medicinal; (4) by physical methods, massage, electricity, and washing the stomach; (5) by baths and the use of mineral water. The use of all these methods requiring such trained experience that reference must be had to special works on this subject for complete detail.

STOMACH.

Ulcer of the Stomach.—This is a loss of substance of the gastric mucous membrane, varying from the size of a pin head to that of a silver dollar or even larger. Ulcers may penetrate all the layers of the stomach and cause perforation. They occur most frequently on the small curvature or in the pyloric end of the stomach.

The fundamental cause underlying ulcer of the stomach is a lessened power of resistance of the mucous membrane of the stomach. This lessened resistance is local and depends upon disturbances of the circulation in the stomach. When the mucous membrance is injured either by some hard, sharp or pointed substance such as may accidentally be swallowed—for instance, pieces of egg and oyster shell, fish bone, nut shells, hard seeds—then the defective circulation and impaired resistance of the mucous membrance to the gastric juice bring about a kind of self-digestion of the injured spot, which eventually developes into an ulcer. But there are toxins that originate from the colon in the digestive tract of the patient himself and which, when absorbed during long periods of time, may bring about gastric ulcer independent of any local injury. The colon bacillus, a parasite present in all human colons, is capable of producing such a poison.

The subjective symptoms are severe pain, called epigastralgia, cutting and burning in character; the pain in the same case, as a rule always occurs at the same time after food has been taken. When the ulcer is at the pylorus the pain does not occur until two or three hours after eating, and is frequently accompanied by the vomiting of highly acid gastric contents. These pyloric ulcers most often lead to dilatation of the stomach because they produce a permanent stricture or obstruction of the outlet of the stomach, but pyloric ulcers may also cause spasmodic (and merely transient) constriction and closure of the pylorus or ring-muscle at the outlet of the stomach. When an attack of violent epigastralgia with vomiting of acid liquids occurs between 6 and 7 in the evening or between 1 and 2 o'clock in the morning (these are the hours at which the stomach evacuates its last portions, if the meals have been taken at regular hours) we generally have to deal with an ulcer at the pylorus. The most important of the objective symptoms are vomiting of blood, the presence of blood in the stools, and the existence of an excess of hydrochloric acid in the contents of the stomach. The diet is the most important consideration in the treatment. Some cases are so severe that for weeks no food at all can be allowed by the stomach; the patient must absolutely rest in bed, and be fed by nutritive enemas. Then, as the symptoms improve, the following foods are allowed: soups made of farina, egg and bouillon, raw eggs, gelatins, tea or chocolate with cream, boiled and thoroughly strained

oatmeal, rice, or farina. Later on broiled sweetbread and calves' brain are permissible. The passing over to the meat foods should be very cautious and slow, and as there is great excess of acid in the gastric juice, alcalies must be taken after the food. One of the most effective treatments is by means of olive oil, two to three tablespoonfuls taken warm before each meal.

Erosions and Fissures.—These have about the same symptoms, though less severe, and are treated in about the same manner as gastric ulcer.

Cancer of the Stomach.—Causation unknown. The onset is insidious. The symptoms are loss of appetite with repugnance against meat, great prostration, anemia, cachexia, emaciation. When the cancer is in the end of the esophagus there is great difficulty in swallowing; when it is in the pyloric end there is obstruction with dilatation of the stomach and vomiting. Cancer at the lower end of the esophagus, called the cardia, causes obstruction of the esophagus, just as those at the outlet of the stomach or pylorus cause obstruction there, but when they occur in the body of the stomach, say at the lesser or greater curvature, they do not produce obstruction. Thus we have three types: (1) cancers of the cardia with obstruction of the esophagus and difficult swallowing, impossibility to pass the stomach tube; (2) cancers of the pylorus causing obstruction, stagnation of the contents, vomiting, dilatation; and (3) cancers in the extraostial parts of the stomach causing no obstructions. When a tumor is palpable in the stomach it is as a rule a cancer. In both cancers and ulcers blood is present in the stools. When blood is vomited from an ulcer it is usually bright red, but when it is vomited from a cancer it is usually a dark coffee-ground color. The exact diagnosis requires analysis and microscopical examination of the stomach contents and stools. Dr. Hemmeter has originated a method by which gastric cancers and ulcers can be made visible by the X-rays. (See Hemmeter—*Archives f. Verdauungskrankh* Bd. XII, p. 357 (Berlin, 1906). Direct inspection of the esophagus and stomach, by means of the esophagoscope and gastroscope, is a valuable method for directly viewing ulcers and cancers of these organs. These methods require a skilled technique and then are harmless.

The only successful treatment is by a surgical operation; all other treatments have only a palliative value.

Dilatation of the Stomach.—Dilatations may be acute or chronic. The acute forms are extremely rare, and partake more of the nature of a paralysis of the nervous and muscular apparatus of the stomach. Chronic dilatations are really secondary diseases, consequent upon some defect in the pylorus, such as some obstruction to the outlet, an indurated chronic ulcer, a scar, a pyloric spasm, or a cancer. But there are dilatations which are

due to disease of the nerves and muscles of the stomach, and where even at operation nothing abnormal can be found at the outlet. Dilatation as well as gastroptosis, and according to Hemmeter even gastric ulcer and cancer, can be made visible to the naked eye by giving the patient a gruel made of oat-meal containing a heaping teaspoonful of subnitrate of bismuth. When the patient is placed before an *x*-ray apparatus, the bismuth cuts off the *x*-rays and not only can the location and size of the stomach be plainly seen, but after some training and with experience ulcers and cancers can be made visible also.

The symptoms are: Copious vomiting, especially of food that has been taken one or two days previously. Some patients force the vomiting by tickling their palates with their fingers, in order to be relieved of the boring cramp-like pains in the pit of the stomach, which, just as is the case with gastric ulcer, does not cease until the stomach is evacuated. In addition such patients suffer from heart burn (pyrosis), fulness and distention of the abdomen; the appetite may be good, but the patients are afraid to eat because of the distressing consequences. The secretion of urine is very much reduced. Sometimes not more than twelve ounces in the twenty-four hours. The objective signs are: Very low position of the greater curvature of the stomach, gastric peristaltis visible through the abdominal walls running from the cardia to the pylorus (from left to right). This is absolute proof of the existence of stenosis or obstruction. The presence of remnants of food, gained from the fasting stomach before breakfast by means of the stomach tube, is a sure proof of the existence of a dilatation. In benign dilatation hydrochloric acid is always present in the test-meals Generally there is an excess of it. Hyperchlorhydria and hypersecretion are in this case a consequence of the irritating condition at the outlet of the stomach. When the obstruction is malignant, *i. e.*, when it is due to a cancer, the hydrochloric acid secretion is lost and in the stagnating masses, we find only such abnormal organic acids as are produced by the fermentation of food, especially lactic acid.

Whether a dilatation of the stomach will be recovered from or not depends upon the cause. If it is a benign obstruction, such as ulcer of the pylorus or of the duodenum, erosions, fissures, perigastric adhesions, adhesions emanating from the gall-bladder and caused by gall stone disease (pericholecystitis), epigastric hernia, trauma, then the dilatation is curable although a successful treatment may require an operation; but if the cause is a cancer we can hope only for a prolongation of life by surgical treatment.

Even where the cause is a cancer, an operation should be undertaken if the general condition of the patient permits it. Cases are on record in which life has been

prolonged in comfort for four, six, and eight years after the operation. Dilatation of the stomach not due to cancer is treated by operation also when the other bloodless means of treatment do not succeed promptly. Ulcers, fissures, and erosions of the pylorus and the consequent spasm of the pylorus with dilatation of the stomach can be cured by purely medical, dietetic, and mechanical treatment and one need not resort to surgical operation as long as the patient shows the slightest improvement and gain of weight. The stomach can be washed out daily through the stomach tube and freed of its fermenting masses. This must be done before breakfast. The food should be so finely prepared that it can be poured through a sieve having openings no larger than the thickness of a darning needle. Thus boiled milk, raw eggs, soup made of milk, flour, and eggs, scraped beef, bouillon thickened with egg and farina or rice, gelatins with wine; in short all foods that can pass a constricted portion of the pylorus without irritation. When there is excess of hydrochloric acid three ounces of warm olive oil poured into the stomach after washing it out acts beneficially in arresting this excessive secretion. The intragastric application of the faradic current is also a valuable adjuvant in the treatment. If after a month of non-surgical treatment there is no improvement, the patient should submit to an operation. As the stomach does not absorb water all diseases associated with weakening of the musculature of the stomach should be treated by exclusion of water from the diet as far as possible. In extreme cases the necessary water can be given in form of enemas, injected through the colon tube, and the patient can relieve the dryness of the mouth by swallowing cracked ice. Abdominal bandages, if properly applied in the reclining posture, are a great help in the treatment of dilatation and gastroptosis.

Gastroptosis, Displacement of the Stomach, Gastric Atony.—The displacements of the abdominal organs in their relation to diseases of the digestive tract were first thoroughly appreciated in clinical study by Glenard, who correctly emphasized that many so-called purely nervous diseases of the stomach were traceable to these displacements. Stiller thereafter described the so-called enteroptotic constitution (habitus enteroptoticus) as meaning an inherited weakened constitution, especially an infirm nervous system. This type of human being Stiller designated as the type *asthenia universalis congenita.* This condition of congenital nervous infirmity is frequently associated with a long, flat, narrow chest or thorax. Stiller has also called attention to the fact that the tenth rib in such cases is not attached to the arch of the rib cartilages, but floats about loosely. Another sign of importance has been called attention to by Hemmeter, it is the so-called subxiphoid angle. The xiphoid cartilage is the tip of the breast bone and the angle which the

edges of the short ribs make with this xiphoid tip is the subxiphoid angle; this angle should be from 100° to 140° in normal individuals, but when the habitus enteroptoteus exists it may be only 60° or even less. Hemmeter has taken measurements of the entire body in various directions in many hundred normal and diseased individuals and when there is a subxyphoid angle of 70° or less, he finds that the stomach and the right kidney are invariably displaced downward and sometimes other abdominal organs are displaced at the same time. All of these relations of the bony frame of the entire body as studied in connection with universal neurasthenia and displacements of the abdominal organs indicate that gastroptosis and enteroptosis are not diseases per se, but rather they are accompaniments of an inherited weakened state of the entire body, especially of the nervous and digestive system. All patients suffering with gastroptosis or enteroptosis have a vertical diameter of the chest which is longer than the transverse diameter. Normally the transverse diameter is decidedly the greater. It must be apparent that, if the chest is elongated and compressed from side to side in this manner, the abdominal organs immediately beneath the diaphragm must be displaced downward. In a large proportion of these cases the heart is also displaced downward, the aortic arch is drawn out.

Owing to the congenital irregularities of the chest formation the stomach, which should normally occupy a more or less horizontal position in the upper abdomen, is forced to assume an unnatural vertical position. Anything that weakens the abdominal muscles will of course aggravate the displacements already existing. Anything that weakens the nervous system acts in the same manner. Gastroptosis can be acquired as well as congenital and those persons who acquire it in later life need not necessarily be at the same time afflicted with universal neurasthenia; but all cases that are congenital are invariably associated with this neurasthenia.

The subjective symptoms are the most varied dyspeptic difficulties; there is no complaint conceivable to human mind which sufferers of that type do not at one time or another give expression to. At the same time actual pain in the stomach is a very rare complaint. The most frequent statements given are those describing distention, fulness, and oppression in the stomach after large meals and in severe cases after any food whatsoever. In addition they suffer with regurgitation, eructation, nausea, loss of appetite, constipation, incapacity for work, and headaches.

The objective symptoms are emaciation, anemia, sharp xiphoid angle, floating tenth rib, greatly relaxed abdominal walls. On distending the stomach with a mixture of sodium bicarbonate and tartaric acid one teaspoonful of each in a half of tumbler of water (it is

advisable to drink the tartaric acid first) or on showing up the stomach by means of the *x*-ray, it is found that it is displaced downward. Sometimes it may be located below the navel, at times the kidney, the liver, the spleen, and the transverse colon are displaced downward at the same time.

The use of corsets or of belts should be prohibited. A well fitting abdominal bandage should be applied in the horizontal position with the hips elevated by several pillows. The iron of the blood should be increased, everything that tends to strengthen or fatten the patient should be done, although it may give much dyspeptic distress in the first two or three weeks. The use of electricity and stimulating baths are followed by good results. No cast-iron, hard-and-fast dietetic rules should be laid down. Such patients should eat whatever they please to eat, avoiding naturally such things which common sense tells them are indigestible.

Nervous Dyspepsia.—This condition has much in common with the form of dyspepsia which has been described in the preceding section. In purely nervous dyspepsia, however, we do not find the habitus enteroptoticus, or enteroptotic constitution. The formation of the chest and abdomen is on the contrary normal; the patients are not so emaciated or anemic as those with gastroptosis. The xiphoid angle is generally normal and rarely under 80°.

The symptoms are almost identical with those of gastroptosis and enteroptosis, with exception of the objective signs and symptoms which are wanting. The treatment is hygienic, dietetic, and physical, that is, by means of electricity and massage. Mineral baths, mineral waters, and climatic changes are of manifest help in most cases.

Neuroses, Nervous Diseases of the Stomach.—This group comprises by far the largest number of diseases that can befall the human subject, and they are very difficult of recognition, particularly when they are associated with typical organic diseases of the stomach or other organs. Those nervous diseases of the stomach, which are associated with the enteroptotic constitution can be recognized by the objective signs described in the articles on *Gastroptosis* and *Enteroptosis.* Every subject that has these physical signs has a congenital infirmity of the central nervous system, and some have neuroses of the stomach.

There are mainly three groups of gastric neuroses: (1) Those that affect the motility or contractile force of the organ; these are the neuroses of peristalsis. (2) Sensory neuroses. (3) Neuroses of secretion. Then there is an illy defined nervous affection of the stomach, which may exhibit signs and symptoms of all three of these groups. This is called neurasthenia gastrica.

Heterochylia Gastrica.—Variable Secretion of the

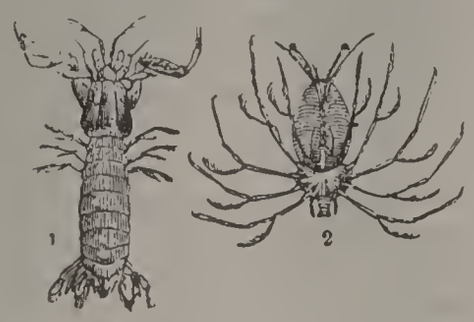
Gastric Juice.—Among the secretory neuroses is a curious abnormality first described by Hemmeter, and confirmed by Boas and others. This disease is characterized by extreme variations in the quantity and quality of the secretion of the gastric juice. After the identical test-meals, these observers have found in the same patient and on the same day, in some analyses marked excess of hydrochloric acid and pepsin and at other times entire absence of these constituents. Under such conditions one of course never knows what remedies to administer to relieve the patient because it is impossible to foretell whether he has an excess or a lack of hydrochloric acid and ferments. As there is no change in the structure of the stomach in this disease, the entire treatment must be directed toward the nervous system, by making use of the sinusoidal electric current or the galvanic current along the spine of the patient and over the region of the stomach. Electrical baths, massage, life in the country (mountains or seashore), abstention from all kinds of mental work, and of all kinds of excesses in tobacco and alcohol. These lines of treatments are applicable to all neuroses and a detailed description of the diagnosis and treatment would lead us too far here.

Bibliography.—Hemmeter, *Diseases of the Stomach;* Ewald, *Diseases of the Stomach,* translated into English by Morris Manges; Riegel, *Erkrankungen des Magens,* being Vol. XVI. of Nothnagel's *Encyclopedia on Special Pathology and Therapy;* Fleiner, *Krankheiten der Verdauungsorgane;* Einhorn, *Diseases of the Stomach;* Martin, *Diseases of the Stomach;* Abercrombie, *Investigations on Diseases of the Stomach;* Habershon, *Diseases of the Abdomen;* Brouardel et Gilbert, *Traité de Médecine et de Therapeutique,* Vol. IV.; Hemmeter, *Organic Diseases of the Stomach;* Leo, *Krankheiten der Bauchorgane;* Robin, *Traité de Therapeutique appliquée,* fasc. XII. (article on indigestion by G. LeMoine).

STOM'ACH-PUMP: a small pump or syringe used for removing matter from the stomach, for washing it out, or for injecting fluids into it. It resembles the common small syringe, except that there are two apertures near the end, instead of one, which, by means of valves in them opening different ways, serve respectively as a sucking and a forcing passage. When the object is to extract something from the stomach, the pump is worked while its sucking orifice is in connection with an elastic tube passed into the stomach; and the extracted matter escapes by the forcing orifice. When it is desired to throw cleansing water or other liquid into the stomach, the connection of the apertures and the tubes is reversed.

STOMAPOD, n. *stō'mă-pŏd,* STOMAPODA, n. plu. *stō-măp'ō-dă,* or STOMATOPODA, n. plu. *stō'mă-tŏp'ō-dă* [Gr. *stoma,* the mouth; *pous* or *poda,* the foot]: order of malacostracous crustaceans, so called from the arrangement of their thoracic or true feet in connection with the mouth, which is usually furnished with one or more pairs of jaw-

feet: to this order *Squillidæ*, Glass-crabs, etc., belong. All are marine. They are most abundant in tropical seas, but some are found in temperate parts of the world. They have seven or eight pair of legs, mostly near the mouth. The gills are external, adhering to the appendages beneath the abdomen, which is elongated and terminates in an extended tail fin. The rings which bear the eyes and the antennæ are not confounded with the rest of the head, as in the *Decapoda*, but are more distinct. The carapace often leaves the latter rings of the thorax exposed. The heart is very different from that of the *Decapoda*, assuming the form of a long cylindrical vessel throughout the length of the abdomen. The Stomapoda inhabit deep parts of the sea, many of them living at the bottom, while some, e.g., Glass-crabs, are found floating at the surface.



Stomapoda.
1, *Squilla stylifera*. 2, *Phyllosoma commune*.

STOMATE, n. *stō'māt*, STO'MATES, n. plu. *-māts*, also STOMA, n. *stō'mă*, STOMATA, n. plu. *stō'mă-tă* [Gr. *stoma*, a mouth; *stomata*, mouths]: in *bot.*, minute opening in the epidermis of plants, communicating with intercellular spaces—especially in the leaves and other green parts exposed to the air. STOMATITIS, n. *stŏm-ă-tī'tĭs*, inflammation of the mouth. STOM'ATOUS, a. *-tŭs*, having stomata.—*Stomata* or *Stomates* in plants were noticed first by Grew, who

a, Stomata.
1, *Strobilanthes sabiniana*. 2, *Croton variegatum*. 3, *Limnocharis plumieri*.

described them in his *Anatomy of Plants* 1682. They are formed usually by two semilunar cells, which are as lips to the orifice, and are filled with green matter; but sometimes the cells arranged around them are more numerous. They are generally of elliptical form, but sometimes circular, and sometimes quadrangular. These differences are very characteristic of particular species, genera, or orders of plants. In a moist atmosphere, they are open; but when it becomes dry, they are closed, or nearly so. It appears that they are organs of transpiration, and that their opening and closing according to the moisture or dryness of the atmosphere regulates it suitably to the requirements of the plant. They do not occur in any part of the plant covered by the soil, nor in submerged leaves, nor on the lower side of

floating leaves. Succulent plants have very few; so that these plants retain for a long time the moisture which they have imbibed, and are thus adapted for living in a dry atmosphere. Stomata are generally most abundant on the under side of leaves; but in leaves which grow vertically, they are often almost equally numerous on both sides. In general, they are irregularly placed; but in grasses and many other endogenous plants with parallel-veined leaves, they are in regular rows; and in some other plants, in little groups. The number in a sq. inch varies from 200 in the mistletoe to almost 450,000 in the under side of the leaves of *Solanum sanctum*. Stomata are not found in mosses, lichens, algæ, and fungi; but they exist in some of the *Hepaticæ*, as in *Marchantia*, in which their structure is more complex than in the higher plants; each of them consisting of a kind of shaft of four or five rings placed one upon another, every ring made up of four or five cells, and the lowest ring apparently regulating the aperture by the contraction or expansion of the cells which form it.

STOMATODE, n. *stŏm'ă-tōd* [Gr. *stoma*, a mouth; *stomatos*, of a mouth]: in *zool.*, possessing a mouth, as in the so called *stomatode* Protozoa.

STONE, n. *stōn* [AS. *stán;* Dan. and Sw. *sten;* Dut. *steen;* Ger. *stein*, a stone]: any loose mass of earthy matter of considerable hardness; popularly, a piece of rock; a mineral (see below): a Gem (q.v.): article made of stone, as a *gravestone:* a morbid secretion formed in the bladder; a disease (see CALCULUS, in Medicine: LITHOTOMY: LITHOTRITY): a testicle; hard kernel of a fruit, forming the case which contains the seed; a weight of 14 lbs.; a weight varying in amount (see below): insensibility: ADJ. made of or resembling stone; hard: V. to pelt or kill with stones; to free from stones, as fruit; to face with stones; in *OE.*, to harden. STON'ING, imp.: N. the act of one who stones by pelting; the act of separating the fruit from the hard kernel or kernels. STONED, pp. *stōnd*. STON'ER, n. *-ér*, one who or that which stones. STON'Y, a. *-ĭ*, made of or resembling stone; abounding in stones; hard; solid; cruel; unrelenting; pitiless; obdurate. STON'INESS, n. *-ĭ-nĕs*, the state or quality of being stony or abounding with stones; hardness like stone. STONE-LIKE, a. having the appearance or consistence of stone. STONE'LESS, a. *-lĕs*, having no stones. STONE-BLIND, completely deprived of the organs of sight. STONE-BOW, in *OE.*, a crossbow which shoots stones. STONE'S-CAST, or STONE-CAST, the distance to which a stone may be thrown by the hand. STONE-CHATTER, bird whose notes often resemble the knocking together of two stones (see STONE-CHAT). STONE-COPING, hewn stones placed on the top of a wall, and made to slope and sometimes slightly project over it. STONE-CROP, common plant of the genus *Sedum*, ord. *Crassulăcĕæ* (see SEDUM). STONE-CUTTER, one whose occupation it is to hew or cut stones. STONE-CUTTING, the business of hewing stones (see STONE-CUTTING AND DRESSING MACHINES). STONE-DEAD, a. lifeless as a stone. STONE-FENCE, drink composed of sweet cider and apple brandy or other liquor. STONE-FLY (see below).

STONED FRUIT, fruit deprived of its hard kernels. STONE LILIES, a popular name for the encrinites, in allusion to the resemblance which they bear to the flower and stalk of the lily. STONE MASON, one who works in stone, or builds with it. STONE PERIOD (see BRONZE, AGE OF). STONE-POCK, old name for a modification of smallpox, in which the vesicles dry up into hard tubercles instead of proceeding to maturation. STONE-STILL, motionless; perfectly still. STONEWARE, coarse kind of clay-made articles for domestic use (see POTTERY). STONE-WORK, masonry; anything done in stone, or built with it. STONY-HEARTED, a cruel; pitiless. METEORIC STONES, hard stony matter or concretions which fall through the atmosphere, and which come from some region beyond it. PHILOSOPHER'S STONE, a substance which it was supposed, could it be discovered, would change any other metal or material into gold. ROCKING-STONE, a large stone so balanced on the top of another that a slight force will cause it to move and oscillate. TO LEAVE NO STONE UNTURNED, to spare no exertions; to do everything that can be done.

STONE, *stōn:* market-town of Staffordshire, England; 7 m. n.n.w. of Stafford, 7 m. s. of Stoke; on the left bank of the Trent. Shoemaking, tanning, malting, and brickmaking are chief industries. Near the church are remains of an Augustinian monastery dating from the foundation of a college of canons 670.—Pop. (1871) 3,732; (1881) 5,669; (1891) 5,754.

STONE: a weight in use throughout n. w. and central Europe, but varying much in different countries. It is employed on the continent chiefly for weighing wool, hemp, flax, and feathers, the flax-stone containing twice as many lbs. as the S. for wool and feathers. In all the principal commercial states of Germany, the S. (of flax) is the $\frac{1}{5}$ of a cwt. (centner = 100 or 112 lbs.), i.e. 20 lbs., in Prussia and the Zollverein, Hamburg, Lübeck, and Bremen; 22 lbs. in Austria, etc.; in Britain it is the $\frac{1}{8}$ of a cwt., or 14 lbs.; in Sweden it is equivalent to 32 lbs. In Great Britain, though the S. of 14 lbs. is the only legal imperial weight of the kind, stones of other values are in regular use, e.g., a S. of 24 lbs. for wool, and one of 8 lbs. for butcher-meat.—In the United States the S. is little used.

STONE: concreted earthy material; used for building, paving, millstones, grindstones, honestones, ornamental purposes, etc.: see BUILDING STONE: QUARRY: MILL: GRINDSTONE: HONE: MARBLE: GRANITE: SLATE: ETC.: also STONE-CUTTING AND DRESSING MACHINES.—Some general remarks on Building Stone are added here. The desirable properties in a building stone are, that it be compact, insoluble in water, not easily altered by the atmosphere, and not liable to take on a vegetable coating. These qualities depend on its chemical composition and on its mechanical structure. Building stones may be divided into three classes—siliceous, calcareous, and composite. Siliceous stones (including granite, porphyry, gneiss,

greenstone, basalt, sandstone, slate, serpentine, etc., and containing 45 to 99 per cent. of silica) are, as a general rule, the most durable for building. Their durability is affected by certain of their ingredients, as by the felspar in granite, and salts of iron in sandstone. Certain ferruginous sandstones, comparatively soft when first quarried, harden by exposure. Much study has been given to the question of durability of different S., but long trial is the surest test. In the case of the brown sandstone largely used in New York, many buildings have suffered where the stone scales by exposure of surfaces parallel to the lamination. Calcareous stones (simple limestone, travertine, marble, etc.) are slightly soluble in pure water, and more so in carbonic acid water; they are liable to splinter by water freezing in their pores, are acted on by acid gases (e.g., the sulphurous acid gas produced by combustion of most kinds of coal), and are somewhat liable to be stained by minute plants. Still, some of them are lasting enough in a rural atmosphere. The failure of the magnesian limestone selected for the Brit. houses of parliament presents an instance of a stone lasting for centuries in a country church, yet quite unfit to withstand the wasting action of the atmosphere of a great city. Composite stones, in which neither the silica nor the lime greatly predominates, are unimportant. See STONE, PRESERVATION OF.

A leading account of building stones in the United States is in Gen. Q. A. Gillmore's *Strength of the Building Stone of the United States* (1874); also in the Centennial and Smithsonian Institution *Reports*, and *Transactions* of the Amer. Soc. of Civil Engineers.

ARTIFICIAL STONE.—This properly would include burned clay wares used for building purposes, e.g., bricks, Terra Cotta (q.v.), etc., as well as the various cements. We here deal with only the siliceous artificial S. produced by the cementing properties of soluble alkaline silicates on sand, which has been the subject of many experiments. In 1825 Prof. J. N. von Fuchs, of Munich, published a paper on various applications of these silicates, and so laid the foundation of a new industry. To Kuhlmann, of Lille, however, is mainly due the practical application of the art. The process, as at first practiced by Ransome, of Ipswich, England, consisted in mixing the gelatinous silicate of soda with sand and a little powdered glass and clay, in the proportions of sand, 10 parts; glass, 1 part; clay, 1 part; silicate of soda, 1 part: these ingredients were thoroughly incorporated in a pugmill, and brought to the consistency of putty. The plastic nature of the substance at this stage allows it to be molded with ease into an endless variety of forms, even elaborately ornamental. After leaving the molds, the objects are dried in close ovens, and then removed to kilns, where they are fired at gradually increasing temperature, which finally reaches red heat. In the kiln the goods are bedded up in dry sand, to prevent any of the twisting or loss of shape which commonly disfigures large objects

in baked clay. When the firing is completed, the material is a semi-vitrified mass, with the appearance, properties, and composition of a fine sandstone.

A later patent by Ransome consists in producing a hard and durable material altogether without baking, by effecting a double decomposition with the silicate of soda and the chloride of calcium. Such materials as sand, chalk, or other minerals are intimately mixed with a proper quantity of a solution of silicate of soda, this being secured, as before, by the operations of a pug-mill. In this plastic condition they are molded into any required form, after which they are saturated with a solution of chloride of calcium. The silica combining with the calcium forms at once an insoluble silicate of lime, which cements into a firm mass all the particles of sand, lime, etc., used in the composition. The chlorine, on the other hand, combines with the soda to form common salt (chloride of sodium), readily removed by washing. To avoid the difficulty of removing all traces of chloride of calcium from artificial stone made by this last process, Ransome, 1872, succeeded in making a very compact stone by mixing lime and a natural soluble silica, found in a rock forming a stratum of the lower chalk in Surrey, with sand and silicate of soda: in strength this material excels Portland stone, not breaking so readily by a given transverse strain.

The objects into which artificial stone is manufactured are very miscellaneous; whatever, in fact, is made of real stone can be formed also in the artificial. Among prominent applications of it are grindstones, millstones, tombstones, monuments, chimney-pieces, balustrades, fountains, vases, and statuary.—See Gen. Q. A. Gillmore's *Béton, and Other Artificial Stones* (1871), and *Portland, Roman, and Other Cements and Artificial Stones* (1876).

Building and Ornamental.—The stones used for building and decorative purposes may be grouped under the four general heads of (1) Granites and Gneisses, (2) Marbles, (3) Limestones and Dolomites, and (4) Sandstones. Descriptions of these and their various uses will be taken up in the order named.

(1) *Granites and Gneisses.*—Under the name of granites are included a series of rocks of eruptive origin, consisting mainly of the minerals quartz and orthoclase feldspar, while there is nearly always present more or less mica, and sometimes minerals of the hornblende and pyroxene group. These rocks are very homogeneous and massive and the structure what is known as crystalline granular. Great variations in texture occur, some varieties being so fine that the individual minerals can scarcely be determined without the aid of the microscope, while in others the constituents may be an inch or more in length. Often large crystals of feldspars occur imbedded in a finer groundmass, giving rise to what is known as a porphyritic structure. In color the granites

are usually some shade of gray, though pink and red varieties are not uncommon. They are among the strongest, most massive and durable of natural building materials, and all things considered, are perhaps better adapted to a wide range of structural and ornamental work than any other class of stone. The crushing strength varies from fifteen to thirty thousand pounds per square inch. Though the colors are, as a rule, cold, the appearance of strength which they impart will always render them desirable, particularly in massive structures. The introduction of machinery into stone working, moreover, renders possible the production of elaborately carved surfaces such as but a few years ago would have been possible only on a soft rock like marble. This fact renders the stone suited to a wider range of structural application than those of any other type. Being massive throughout, without rift or grain developed sufficiently conspicuous to be detected by the ordinary observer, the granites are eminently adapted for columns, monuments and other structural forms that are to be viewed from all sides, and in which, as a consequence, bedding lines or other blemishes would be unsightly.

The term gneiss is applied to rocks of the same mineralogical composition as the granites, but in which the various constituents are arranged in approximately parallel though often wavy lines, giving rise to a banded or foliated structure. On account of this banding, such stones are not suited to so wide a range of application as the granites.

In the United States granites are to be found in all of the states bordering along the Appalachians from Maine to Northern Alabama. The quarry industry has been developed to a very great extent in the New England States and to a less extent in those to the southwestward. The most widely known and important of the granites throughout this area are the building granites from the coast of Maine and Massachusetts, the monumental granites from Barre, Vt., Quincy, Mass., and Westerly, R. I. For building purposes the lighter colored varieties are, as a rule, preferred, and to meet this demand, quarries of an almost white granite have of late years been developed in Bethel, Va., and near Atlanta, Ga. The Bethel stone may be seen in the National Museum building in Washington and the Union Station in the same city, the effect, so far as color is concerned, being that of marble, with, at the same time, the strength and massiveness of granite.

Throughout the entire Mississippi Valley practically nothing in the way of granitic material is found, excepting in Iron, Madison and San Francois counties, Missouri; near Little Rock in Arkansas, and the Ozark regions of Oklahoma. Minnesota and Wisconsin, however, have abundant materials of a nature suited for local use, and the latter state, fine monumental stone

which finds its way into the eastern market. The region west of the front range of the Rocky Mountains is rich in material of this nature, which has as yet been but little developed, save in the states bordering immediately on the Pacific Ocean. In years past a considerable amount of granite has been imported into the United States, particularly that of a nature suited for monumental work. The well known red granites of Scotland are among this class, though of late years the imports have very largely fallen off.

(2) *Marbles.*—The term marble, like many another popular names, is one wholly lacking in scientific precision. A marble may perhaps be best defined as any stone composed essentially of carbonate of lime, alone, or the carbonates of lime and magnesia in varying proportions which, owing to its color and texture, is sufficiently beautiful for a high grade of building material or for monumental and decorative work. Geologically, marbles differ from ordinary limestones and dolomites only in that the metamorphic action to which they have been subjected has been just sufficient to develop in them the essential color and structural features. In color, marbles vary from pure white, through all shades of gray, to black; yellow, pink, brown and red are by no means uncommon, the gray and black hues being due to carbonaceous matter, and the others mainly to iron oxides. In texture marbles vary from finely or coarsely crystalline granular to compact and apparently amorphous. At times they are highly fossiliferous. A high grade of marble for polished interior decorative work should be so compact as to yield under the hands of the workmen a close, enamel-like surface with little, if any, granulation. For building and statuary work, on the other hand, a granular stone is the most desirable, giving to the tool-dressed surface a sparkling effect much more pleasing to the eye than do the compact varieties. Marble, being a metamorphic rock, is naturally limited in its distribution to metamorphic areas. In the eastern United States these areas extend along the Appalachians from Maine to northern Alabama. Not all the material throughout this region, however metamorphosed it may be, possesses the desired qualities such as render it worthy of the name. The most noted marbles of the United States are those of western Vermont, the material being of a white, veined with green, or deep blue gray, to nearly black color. These are used for building purposes and for interior work. In Connecticut, Massachusetts, and New York, white, granular, dolomitic marbles have been quarried for building purposes, and the same is true of Pennsylvania and Maryland. No high grade material for ornamental work, however, occurs until the region about Knoxville, Tenn., is reached, where there is an abundant supply of gray and pink granular marble which forms the chief material for floor

tiling and wainscoting throughout the eastern United States. Here also occurs a chocolate and white mottled stone which at one time was in favor throughout the country for furniture. What are probably the most noted building marbles of the United States today are the coarsely crystalline white, dark mottled, and sometimes pinkish crystalline limestones found in Pickens and adjoining counties in Georgia. These are of comparatively recent development, but have already a wide application. As was the case with granites, the entire Mississippi Valley region is deficient in marble, and the next deposits to be noted are the white marbles of Yule Creek, Gunnison county, Colorado; white, dark-veined marbles near Bowie, Ariz.; the white granite dolomites of Inyo county, California, and the white marbles of southern Alaska. These are all crystalline granular rocks of the Vermont type, though differing in veination and other markings such as impart beauty and variety.

The United States as yet has failed to produce the highest grade of decorative marbles. Such are still imported in large quantities from Greece, Italy, Egypt, and the French Pyrenees. The statuary marbles come altogether from the Isle of Paros or the region about Carrara in Italy. Among the most noted of the marbles at present introduced into this country, are the Grecian and Italian breccias, the Italian sienna, Algerian numidian, and the compact stones from Hautville, in the French Pyrenees.

In this connection reference should perhaps be made to the onyx marbles and the so-called oriental alabasters. These are spring and cave deposits formed by the evaporation of lime-bearing waters, either on the surface or in rifts and cavities in limestones. The so-called oriental alabaster used by the Egyptians and others for the making of boxes for holding ointments, etc., was a cave deposit in the Eocene limestones of the region of the Nile. The onyx marbles, on the other hand, are hot spring deposits and come largely from regions of comparatively recent volcanic activity. The color of these last varies through light amber to deep green, often dashed with red. The chief commercial source today is Mexico, though like material has been found in Arizona in the United States, and in Brazil and Argentina in South America.

The marbles, it should be stated, as a whole, are less well-fitted for exterior work than are the granites. This for the reason that the carbonate of lime is soluble to a slight extent in the water of rainfalls. The constant expansion and contraction from temperature changes, in connection with this solubility, often brings about serious disintegration, and particularly is this the case in a climate as trying as that of the eastern United States.

(3) *Limestones and Dolomites.*—The rocks brought together here differ from those included under the head

of marble, not so much in chemical as in physical properties. They represent the limestones and dolomites of the ordinary unmetamorphosed types and are lacking in qualities rendering them suitable for the highest grades of ornamental work Rocks of this type are found in their maximum development in the states of the Mississippi Valley, where the agents of metamorphism have exercised but little influence, and the rocks maintain their original sedimentary character. One of the best known rocks of this type is the oölitic limestone extensively developed in the region of Bedford, Ind., and southward into Bowling Green and the Green River district of Kentucky. The stone is of a light creamy color, works very readily under the tool, and is on the whole, admirably adapted for elaborate structure where much carved work is involved. The ease with which they are quarried with the aid of machinery, and the readiness with which they may be worked, as well as their satisfactory colors, have long rendered them favorites for building purposes both in America and abroad. The American stone in texture and color is very similar to the so-called Bath stone of England, which was used in Ecclesiastical architecture as early as the eleventh, twelfth and fifteenth centuries.

(4) *Sandstones and Quartz.*—Under the head of sandstones are included a widely variable series of rocks composed, as the name suggests, of consolidated siliceous sand. With them are included certain rocks of identical nature and origin, but which, through a deposition of siliceous cement, have become partially re-crystallized and are known as quartzites. The so-called Potsdam sandstones of New York and the jasper of Sioux Falls, S. D., are good examples of this last type.

The sandstones are among the most variable and widely distributed of building materials. They vary in color from very light gray, through yellowish, dark gray, brown, red-brown and red. Owing to their high absorptive properties, the sandstones as a whole are not as durable as are some other classes of rock, and as they do not receive a polish, are unsuited for most varieties of ornamental work. As has already been noted, they are among the most widely distributed of building materials. Those which have been most widely used in the United States are the brown-red Triassic sandstones of Connecticut and New Jersey, but which are found also extending southward into Pennsylvania, Maryland, and North Carolina, and the light gray Berea sandstones of Ohio. For many years the brown sandstone was used in New York City almost to the exclusion of all other materials, but the somber color and its poor weathering qualities caused it to be gradually abandoned. Throughout the Mississippi Valley the light gray to buff Ohio sandstone is one of the most popular of the native materials. Owing to the fact that they split out so readily

into comparatively thin slabs with very smooth surfaces, the Devonian sandstones of New York, popularly known as Hudson River bluestones, have been very largely used for flagging purposes.

The sandstones are used, as already indicated, almost wholly for exterior work, as in the walls and steps of buildings. Owing to the ready working qualities of the free stone varieties, they are often elaborately carved. The variety of colors they possess, the possibility of utilizing them in almost any sort of finish, from rock-faced, tool-dressed to sawn or sanded, and the cheapness with which such can be quarried and worked, have long made these stones favorite materials for construction with the architect as well as the builder.

STONE AGE, or AGE OF STONE: in archæology, a period in the history of a people when they employed as material for their cutting tools and weapons stone, they being unacquainted with metallurgy; hence 'stone age' is not significant of a definite period in chronology, but implies the time, longer or shorter, earlier or later, during which the people used stone weapons and tolls. There are populations living in remote situations—in isles of the Pacific, or in the extreme north—who are still in their stone age. The period of the stone age of European populations cannot be defined even approximately in terms of chronology. But in England, Belgium, and France, and across the continent to the shores of the Mediterranean, the men of the stone age were contemporary with animals now either wholly extinct or locally extinct, as the mammoth, woolly rhineroceros, cave lion, cave bear, etc. The stone implements of Europe are divided into two classes—Palæolithic (or older stone) implements and Neolithic (or newer stone) implements. The palæolithic implements are rude in form, and are all of flint, manufactured by chipping only. But the neolithic implements are of finer forms, often highly polished, and made of many kinds of stone besides flint. Palæolithic implements are found in their original situation in the river gravels, in caves, and in association with bones of extinct animals; but the neolithic implements are found in the surface soil, in the kitchen-middens of ancient habitations, and in chambered tombs. The bone implements are well-made needles, awls, javelin or harpoon tips, and certain implements of reindeer horn regarded by French archæologists as instruments and emblems of rule—*batons de commandement*—which usually are carved in relief or ornamented with incised figures of animals and occasionally of human figures. The animals, for instance, a group of reindeer from the cave of La Madelaine, Dordogne, are drawn with wonderful faithfulness, freedom and spirit The neolithic implements are axes and axe-hammers, knives, daggers, spear-tips and arrow-heads, saws, chisels, borers, and scrapers. The axes have usually no perforation for a haft; they

are simply wedges, the butt end of which was inserted in the shaft, or in a socket of stag's horn with a tenon on the upper and mortised into the shaft. Some of the long knives and daggers found in Denmark are marvels of skilful workmanship. The populations of the neolithic time deposited their dead in the chambers of dolmens. The pottery found in such sepulchres in Britain is generally of a hard-baked, dark-colored paste; and the vessels are mostly basin-shaped and round-bottomed; the ornamentation consists almost wholly of straight lines at various angles to each other. Neolithic man in Europe did not subsist on the products of the chase only; he practised agriculture and had the common domestic animals; these facts appear from the grains and seeds and the animal remains discovered in the haunts of these people. And the presence in the kitchen-middens of their sea-coast haunts of the remains of deep-sea fishes is proof that they possessed boats and fishing-lines.

STONE, *stōn*, ANDREW LEETE, D.D.: Congregational minister; b. Oxford, Conn., 1815, Nov. 25; son of Dr. Noah Stone, judge of probate, who was cousin of William Leete Stone. He graduated at Yale 1837, and was for three years a teacher in the N. Y. Institution for the Deaf and Dumb, meanwhile studying theol. in Union Seminary, New York. After some service with the Sunday-school Union, he was pastor of the South Congl. Church, Middletown, Conn., 1844-49; next of the Park St. Church, Boston, 1849-66; then of the First Congl. Church, San Francisco, where, his strength failing 1881, he became pastor emeritus His grace and power as a preacher gave him wide reputation, and his genial disposition made him hosts of friends. Besides occasional sermons and addresses, he published: *Service the End of Living* (1858); *Ashton's Mothers* (1859); *Memorial Discourses* (1866); *Leaves of a Finished Pastorate* (1882).

STONE, CHARLES P.: soldier: 1826-1887, Jan. 24; b. Greenfield, Mass. He was educated at West Point Milit. Acad., and on graduating was appointed brev. 2d lieut. of ordnance, 1845, but within a month was made asst. prof. of ethics in the military acad. He was ordered to duty in Mexico 1846, Jan: in the Mexican war he won the brevets of lieut. and capt. for gallant conduct at Molino del Rey and Chapultepec; and was commissioned lieut. 1853. He resigned his commission 1856, and engaged in banking at San Francisco, Cal., then took charge of a survey of Sonora and Lower California for the Mexican government. Just before the civil war he was called to Washington, re-entered the military service with a captain's commission, and was made inspector-general of the District of Columbia militia. He was appointed colonel of the 14th regiment U. S. infantry, 1861, May 14, and the same month brigadier-general of volunteers. In July he served in the Shenandoah valley under

Gen. Patterson; after Bull Run he commanded a division of the Army of the Potomac under Gen. McClellan. The disaster suffered by the Federal arms at Ball's Bluff, 1861, Oct., was charged to the rashness of Stone in risking a battle without due preparation. He was interrogated by a congressional committee with regard to the causes of the disaster 1862, Jan.; and though his answers seemed to satisfy the committee and to negative the charge of negligence, incompetence, or treachery, Stone was arrested, and for seven months was held in close confinement in Fort Lafayette, New York harbor. He was released unconditionally, but without any explanation, and assigned to duty with Gen. Banks, under whom he served at the siege of Port Hudson, and took part in the skirmish at Bayou Teche, and in the battles of Sabine Crossroads and Pleasant Hill, 1864, Apr. 8 and 9. The following August he was appointed to command a brigade in the Army of the Potomac: he resigned his commission after the battle of Petersburg. Stone was mining superintendent in Virginia, 1865-69. He entered the military service of the khedive of Egypt, 1870, as chief of staff, and was in effect chief commander of the Egyptian army. The khedive conferred on him the decoration of the Osmanie order 1870, and made him grand officer of the Medjii order 1875: he was raised to the dignity of pasha 1873. He returned to the United States 1883.

STONE, David Marion: editor: b. Oxford, Conn.; 1817, Dec. 23; d. 1895, Apr. 2; brother of Andrew Leete Stone. He was a teacher at 16 years of age; a merchant in Philadelphia 1842-49; for a short time editor of the N. Y. *Dry Goods Reporter;* commercial ed. of the *Journal of Commerce,* and, 1861, with William C. Prime, became its co-editor and joint owner, and afterward (1866) its chief editor. For 30 years he was the president of the New York Associated Press, and many years financial writer for the *New York Observer,* and for *Hunt's Merchants' Magazine.* The *Journal of Commerce* was suppressed by the U. S. government for a while in 1864 for publishing Joseph Howard, Jr.'s forged proclamation of President Lincoln; this matter was inserted in Stone's absence. He was authority in his specialties of finance and commerce. In his earlier years he cultivated literature, contributing to magazines, and published a very popular book, *Frank Forest* (1849); and *Life and Letters of Mary Elizabeth Hubbell* (1857).

STONE, James Kent: Rom. Cath. priest: b. Boston, 1840; son of John S. Stone, D.D. Graduating at Harvard Coll. 1861, he studied two years in German and Italian universities; then returned home and entered the volunteer military service, but after six months retired on account of wounds. He then became prof. in Kenyon Co., Ohio; and later pres. of the institution, having in the meantime been ordained priest in the Prot. Episc. Chh

He was pres. of Hobart Coll. 1868-9. In the latter year he renounced Protestantism, and was admitted into the Rom. Cath. Chh. In 1870 he published *The Invitation Heeded*, giving reasons for his change. He entered the congregation of St. Paul the Apostle, and was ordained priest, but about 1875 became a member of the austere order or congregation of the Passionists (q.v.), and after a few years of labor in conducting religious retreats in the United States, was assigned to missionary work in S. America.

STONE, JOHN HOSKINS: 1745-1804, Oct. 5; b. Charles co., Md. He was chosen capt. in Smallwood's battalion of the Md. line 1776, Jan. 2; and in Dec. was promoted col. He served with distinction in the battles of Long Island, White Plains, Princeton, and Germantown; and resigned on account of disability from wounds 1779, Aug. He was governor of Md. 1794-97.

STONE, JOHN SEELY, D.D.: Prot. Episc. minister: 1795, Oct. 7—1882, Jan. 13; b. Great Barrington, Mass. He graduated at Union Coll. 1823, studied for the ministry, and was ordained priest 1827. He was rector successively of churches in Litchfield, Conn., Frederick City, Md., New Haven, Conn., Boston, Brooklyn, Brookline, Mass., and Philadelphia. He was prof. in the Prot. Episc. Theol. Seminary in Philadelphia 1862-67; then was dean of the theol. school in Cambridge, Mass., till 1872. He belonged to the evangelical school of theological opinion. Stone was an impressive pulpit orator. He wrote *Memoirs of Bp. Griswold; The Mysteries Opened* (afterward re-written and entitled *Christian Sacraments*); *Christian Sabbath* (rewritten and entitled *The Divine Rest*); *The Church Universal* (later title, *The Living Temple*); *The Contrast;* and a *Life of the Rev. Dr. Milnor.*

STONE, LUCY BLACKWELL: American reformer; b. West Brookfield, Mass., 1818, Aug. 13; d. Boston. 1893, Oct. 18. She was graduated at Oberlin College in 1847, and in 1855 was married to Dr. Henry B. Blackwell, retaining however, her own name. In 1869 she helped organize the American Woman's Suffrage Association; became connected with the *Woman's Journal* in 1872, and was editor after 1888. Her lectures on woman suffrage made her known throughout the country.

STONE, MARCUS: English painter; b. London, 1840, July 4; son of Frank Stone, A.R.A. He learned his art in his father's studio; exhibited his first picture in 1858 in the Academy, of which he became an associate in 1877, being elected an academician in 1887. Among his better-known pictures are: *Claudio Accuses Hero* (1861); *On the Road from Waterloo to Paris* (1862); *Stealing the Keys* (1866); *Henry VIII. and Anne Boleyn* (1870); *Sain et Sauf* (1875); *Il y en a Toujours un Autre* (1882); *A Gambler's Wife* (1885); and *The First Love Letter* (1889).

STONE, MARVIN CHEATER: American inventor; b. Portage co., Ohio, 1842; d. Washington, D. C., 1899, May 17. He invented several small articles, and afterward discovered a method of imitating, in colored china, the famous 'peach-blow' vase. He acquired a large fortune, and during his later years was engaged in many philanthropic undertakings.

STONE, MELVILLE ELIJAH: American journalist; b. Hudson, Ill., 1848, Aug. 22. He began his journalistic career on the Chicago *Tribune*, but was not permanently settled in it until 1871, when he established the Chicago *Daily News*. In 1881, with Victor F. Lawson, he acquired the Chicago *Morning News*, changing its name to the *Record*. In 1888 he retired temporarily from newspaper work, and spent some years in Europe, and upon his return entered the banking business. In 1898 he became general manager of the Associated Press.

STONE, PRESERVATION OF: protection of stone structures from injury by atmospheric influences. The mechanical preservation of stone can be effected to a great extent by coating the surface with boiled linseed-oil, or with oil paint; but these methods destroy the crystalline appearance which constitutes the beauty of most natural stones. Many experiments have been tried with certain chemical solutions that are not likely to mar the inherent beauty of a stone: the substances most used are those soluble silicates used in making artificial stone (see STONE). The earlier process of Kuhlmann consisted in coating the surface with a soluble silicate of soda or potash, known also as soluble glass, water-glass, and flint liquor. This was applied with a brush, and silification was produced by the silica of the solution entering into combination with the lime of the stone; but this took considerable time, so that, on an exposed front, it was liable to be washed off before the proper hardening took place. The later process of Ransome consists in cleaning the surface of the stone from extraneous matter, and then applying alternate solutions of the above alkaline silicate and chloride of calcium, which forms an insoluble silicate of lime in the pores of the stone. This plan has been extensively used in London, Edinburgh, Glasgow, and elsewhere. Ransome's process is indeed practically the only one in use.

STONE, THOMAS: signer of the Amer. Declaration of Independence: 1743-1787, Oct. 5; b. Charles co., Md. He was a lawyer; was delegate to congress 1774, and strongly favored the setting up of an independent government by the colonies, though instructed as a delegate to oppose that measure. He was again in congress 1777 and 1783.

STONE, WILLIAM LEETE: author and journalist: 1792, Apr. 20—1884, Aug. 15; b. New Paltz, N. Y.; descendent of Gov. Leete of Md. Beginning as printer, he edited

papers in central N. Y. and Conn., finally 1821 the New York *Commercial Advertiser*. He originated the plan of congressional emancipation of slaves 1825; was active in aid for the Greeks; was minister to the Hague under Pres. William H. Harrison; was first N. Y. supt. of schools, and discussed the question of the Bible in schools with Abp. Hughes; and was active in religious and benevolent institutions. He died at Saratoga. His publications include *Hist. of the Great Albany Constitutional Convention* (1822); Letters to J. Q. Adams on Masonry (1832); *Matthias and His Impostures* (1833); *Maria Monk* (1836); *Ups and Downs*, etc. (1836), a satire on fashion; *Border Wars of the American Revolution* (1837); Lives of various Indian chiefs; *Poetry and Hist. of Wyoming* (1864).—His son, WILLIAM L., b. New York, 1835, Apr. 4; d. 1908, June 11, was a graduate of Brown University and Albany Law School, published lives of Sir William Johnson, Col. William L. Stone, Gen. Riedesel, and Mrs. Riedesel; *Hist. of N. Y. City* (1872); *Campaign of Gen. Burgoyne* (1877); and edited the *Journal of Capt. Pausch* (1886).

STONE-CHAT (*Saxicola rubicola:* see CHAT): one of the most common of the British *Sylviadæ*, a pretty little bird, rather smaller than the redbreast, black on the upper parts and throat in summer; the breast of dark reddish color; some white on the sides of the neck, wings, and tail. It makes its nest on the ground, or on a low branch.

STONE-CUTTING AND DRESSING MACHINES: apparatus for working stone into desirable forms. Stone is not easily operated on by machinery, because of its brittleness, its unequal hardness, and the natural cracks which frequently impair its solidity. Accordingly, only in some plainer kinds of work have machines entirely superseded hand operations. Some stones and slates are soft enough to be cut like wood with ordinary toothed saws. Generally, however, the sand-saw is employed. For cutting common kinds of stone, which are not to receive fine polish, a machine has been invented whose cutting portion consists of a circular disc, round whose circumference pointed steel tools are fixed into sockets, giving it the appearance of a large toothed saw. This machine cuts sandstone at the rate of 5 to 6 inches, slate at 3 inches, and soft limestone at 3 inches per minute, supposing these to be in blocks each 2 ft. thick.

For the sawing or slicing of stones the tendency is to use the diamond—the dull black variety which is of no use as a gem. Some machines whose saws have teeth set with these diamonds cut ordinary sandstone at the rate of 75 square feet per second for each saw. Machines for dressing the face of stones by means of a series of chisels in imitation of the handwork of the mason have given fair results.

Marble is cut into slabs by means of a series of thin

plates or blades of soft iron used like saws, but having no teeth. The blades are fixed into a rectangular frame, to which a reciprocating horizontal motion is given. The block of marble to be cut rests on a carriage below the frame, and a small rill of mixed sand and water is constantly falling into the saw-cuts. After the marble has been sawn into slabs, it is cut into narrow pieces as required, by small circular saws with smooth edges, sand and water being applied as above.

The sawn slabs are next submitted to the grinding process: this, for pieces of moderate size, is done usually on a large circular cast-iron plate, called a *sanding-bed* or *grinding-bed,* mounted upon an upright spindle, and supplied with sand and water. The workman places the piece of marble with its face downward upon the grinding-bed, and exerts the proper pressure: the marble is held in its place by guide-rods stretched across the plate. Slabs too large to be manipulated in this way are ground with plates of iron operating upon their surface.

The marble when properly ground, is polished on a polishing bed or table, with an arrangement for securely fixing it while the rubbing is being done. The polishing rubbers are sometimes blocks of wood faced with felt, sometimes bunches of hemp compressed between two side-plates: they are attached to a swing-frame with pendulum-like motion, which draws them forward and backward over the surface of the marble. Flour emery is used to charge the rubbers in the first instance, and putty-powder (oxide of tin) for the finishing polish: instead of emery, sometimes a fine-grained stone known as Water of Ayr stone is used to prepare the marble for the putty-powder.

Cylindrical objects, such as columns or vases, are first formed roughly into shape with a hammer and chisel, and then turned, with a pointed steel tool, on a lathe to which a slow motion is given. When thus brought to an accurate form, a rapid motion is given to the lathe, and the tool-marks ground away by the use of coarse, and then fine, and still finer sandstones—the polishing being completed with emery and putty powder while the object is still on the lathe.

Machinery is applied to production also of flat objects with curved and molded outlines. Fig. 2. represents the essential parts of a machine for this purpose. It operates by the use of a rotatory cutter, guided in its action by a template formed accurately to the intended shape of the article. The cutter, *a*, is of steel or stone, and is attached to the lower end of a spindle driven by bevelled wheels. There is a flange at *b*, which allows the cutter to penetrate the marble till it reaches the template, *c*, and no further. In the process of cutting, the marble, which we will suppose is to receive the shape shown at S. (fig. 3), but seen only on edge at *d*, in fig 2, is constantly drawn up against the

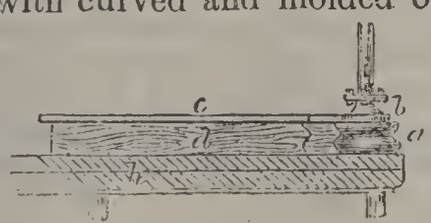


Fig. 2.

cutting-tool by two weights, the one pulling the table, *h* in one direction, the other the carriage on which *h* rests, in a direction at right angles to the former, thus compelling the cutter to follow the outline of the template: the shape of the cutting-tool is, of course, exactly the reverse of the molding to be formed.

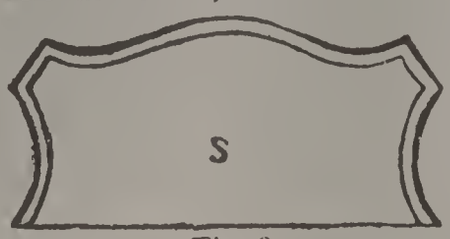


Fig. 3.

In cutting and polishing granite, the machinery and processes are nearly the same as for marble. Objects to which the sawing apparatus cannot be applied must be worked to shape with great care by means of steel chisels and iron mallets, which remove only small portions at a time. As the material is very hard, any defect in the chiselling greatly increases the labor of polishing. So slow, indeed, are the operations with granite, that a saw-blade will not cut through an inch in depth during a whole day, and a good-sized sawn slab requires a week for polishing.

STONE'-FLY (*Perla*): genus of pseudoneuropterous insects, of family *Perlidæ*. The hind wings are broader than the fore-wings, and folded at the inner edge. The body is elongate, narrow, and flattened; the wings close horizontally on the body; the abdomen is generally terminated by two long bristles (*setæ*). The larvæ are aquatic, and much resemble the perfect insect, except in lack of wings A number of species are attractive lure for fishes.

STONE'-FRUITS: popular term for those fruits botanically designated *drupes*, in which the rind is fleshy, and the putamen bony. Many of the finest dessert fruits are of this kind. Those best known in temperate climates generally belong to the nat. order *Rosaceæ*, sub-order *Amygdaleæ* (order *Drupaceæ* of Lindley), e.g., the peach and nectarine, plum, cherry, apricot, etc. In tropical countries, many stone-fruits occur, belonging to *Chrysobalanaceæ* and other nat. orders.

STONEHAM, *stōn'am:* town, Middlesex co., Mass.; on the Lowell system of the Boston and Maine railroad, 12 m. n. from Boston. This prosperous town has several churches, good schools, a free library, two weekly newspapers, and a savings bank. The leading business is the manufacture of shoes and leather; but there are various other industries, including a machine-shop, lumber-mill, and box-factory. Pop. (1870) 4,513; (1880) 4,890; (1890) 6,155; (1900) 6,197; (1910) 7,090.

STONEHAVEN, *stōn-hā'vĕn:* seaport town in Scotland cap. of the county of Kincardine, on the railway from Dundee to Aberdeen: on a rocky bay at the mouth of Carron Water. It is divided into an Old and New Town, on different sides of the river, connected by a bridge. The harbor admits only small vessels. S. has haddock and herring fisheries.—Two miles s., on a projecting rock, stands the famous castle of Dunnottar, former residence of the Earls Marischal.—Pop. (1881) 3,957; (1891) 4,497

STONEHENGE, *stōn'hĕnj* [Sax. *stanhengist*, hanging or uplifted stones]: very remarkable structure of large artificially raised monoliths, on Salisbury Plain, England, two m. from the town of Amesbury, in Wiltshire, England. The neighborhood abounds in sepulchral tumuli, in many of which ancient British remains have been found. The fabric of S., comparatively entire in the early part of the 19th c., has since been so much defaced as to be at first view little more than a confused pile of moss-grown stones; but a minute inspection can still trace its original form. When entire, it consisted of two concentric circles of upright stones, inclosing two ellipses, the whole surrounded by a double mound and ditch circular in form. Outside the boundary was a single upright stone, and the approach was by an avenue from the n.e., bounded on each side by a mound or ditch. The outer circle consisted of 30 blocks of sandstone, fixed upright at intervals of 3½ ft., and connected at the top by a continuous series of imposts, 16 ft. from the ground. The blocks all were squared and rough-

Stonehenge.

hewn, and the horizontal imposts dove-tailed to each other, and fitted by mortise-holes in their under sides to knobs in the uprights. About 9 ft. within this peristyle was the inner circle, of 30 unhewn granite pillars, 5 to 6 ft. in height. The grandest part of S. was the ellipse inside the circle, formed of 10 or 12 blocks of sandstone, 16 to 22 ft. high, arranged in pairs, each pair separate, and furnished with an impost, so as to form 5 or 6 trilithons. Within these trilithons was the inner ellipse, composed of 19 uprights of granite similar in size to those of the inner circle; and in the cell thus formed was the so-called altar, a large slab of blue marble.

There has been much speculation regarding the origin and purpose of S., but these are still in obscurity. A curious legend, found first in the *British Chronicle* of the 10th c., and repeated by Geoffrey of Monmouth and Giraldus Cambrensis, ascribes it to Emrys or Ambrosius, the last British king, who, in the 5th c., aided by the incantations of the magician Merlin, is said to have erected it in memory of 460 Britons who were murdered by Hengist the Saxon. In modern times, the most prevalent opinion has been that, in common with similar structures elsewhere, it was a temple for Druidical worship; but this belief has been shaken by discovery of the sepulchral

character of many other monuments, which also had been presumed Druidical. The circular form has suggested a connection with the worship of the sun; and S. may possibly have been used for the religious rites of successive races and creeds; also as a court of justice or battle-ring for judicial combats. The outer circle is evidently of later date than the rest, and seems to belong to a period when iron tools were in use. See STANDING STONES.

STONEMAN, *stōn'man*, GEORGE: 1822, Aug. 8—1894, Sept. 5; b. Busti, N. Y.: soldier and gov. of Cal. He graduated at West Point 1846; as second lieut. of the 1st dragoons, he was stationed at Ft. Leavenworth; was quartermaster in Cal. 1847; commanded the post in San Francisco 1848-9; engaged in Indian wars on the coast till 1854; and was made capt., and stationed in Texas 1855. Refusing to surrender govt. property at Ft. Brown to the secessionists 1861, he went to Washington, where he was made brig.gen. and chief of cavalry. He did effective work in pursuing the disunionists after the evacuation of Yorktown; commanded a division at the second battle of Bull Run, and the 3d army corps at Fredericksburg; was promoted maj.gen. 1862; was active in raids as leader of a corps of cavalry in Va. and in the Atlanta campaign; was a prisoner at Andersonville 1864, July-Oct.; commanded the dept. of the Tennessee the same year; did notable service in N. C. 1865; and retired from the regular army 1871. Purchasing a ranch in Los Angeles co., Cal., he was Indian agent, railroad commissioner, and dem. gov. of Cal. 1883-7.

STONE RIVER, BATTLE OF: see MURFREESBORO, BATTLE OF.

STONINGTON, *stōn'ĭng-ton:* borough, port of entry of New London co., Conn.; on Long Island Sound, and on the New York New Haven and Hartford railroad; 12 m. e. of New London, 50 m. s.w of Providence, 62 m. e. of New Haven. It has a capacious harbor and daily steamboat communication with Boston and New York. The chief manufacturing establishments are cotton and woolen mills, iron and brass works, boiler works, printing presses, spool factories, machine shops, manufacturing silk and cotton machinery. The products of other manufacturing establishments are silk and cotton thread, velvet, paper cutters, and novelties. The government census of 1900 gives the number of manufacturing establishments, 118; the amount of capital invested, $3,733,679; the number of wage earners, 1,967; the annual wages, $902,740; the annual amount paid for material, $344,536; and the value of the products, $3,231,423. The educational institutions are an English and classical institute, a high school, public elementary schools, private schools, and a public library. The national bank has a capital of $200,000. Pop. (1900) 8,540; (1910) 9,154.

STONYHURST COLLEGE, *stōn'ĭ-hêrst:* Roman Catholic institution, 7 m. n.e. of Blackburn, Lancashire; founded 1794. It was affiliated to London Univ. 1863; and prepares candidates for matriculation at the universities, and for the civil and military services. It has a staff of about 20 professors and masters.

STON'Y POINT: small rocky promontory on the right bank of the Hudson river, at the entrance of the Highlands, 42 m. n. of New York. This and the opposite Verplanck's Point were fortified in the war of the revolution, and were the scene of several contests.—In 1779 June, under orders from Sir Henry Clinton, Brit. commander-in-chief, Gen. Vaughan took possession of Stony Point (driving a small patriot garrison from a redoubt, called Fayette), fortified it, and garrisoned it with a foot-regt., with some grenadiers and artillery. Gen. Wayne with 550 men was detached to take it. After a hard march through the mountains with the Mass. light infantry, he made a night attack July 16—a portion of his men having volunteered as a 'forlorn hope' —with unloaded muskets, depending on the bayonet. Gen. Wayne was wounded, but insisted on being aided forward with his men; and the storming party under the intrepid Col. Meigs pressed on under heavy fire of grapeshot and musketry, and entered the works. The enemy surrendered, with less than 100 loss of killed and wounded on each side. This has been pronounced one of the most brilliant actions on military records. An assault on Verplanck's Point at the same time having failed, the Americans abandoned and destroyed the fortifications on Stony Point June 18.

STOOD, v. *stûd:* pt. and pp. of STAND, which see.

STOOK, n. *stôk* [Ger. *stauchen*, to push, to stow: Low Ger. *stuke*, a heap or bunch: Bohem. *stoh*, a heap, a haycock]: in *Scot.*, a number of sheaves of corn set up on end in a field after cutting; 12 sheaves set up: V. to set up sheaves of grain in stooks. STOOK'ING, imp. STOOKED, pp. *stôkt.*

STOOL, n. *stôl* [Goth. *stols;* OHG. *stuol;* Dut. *stoel;* Dan. and Sw. *stol;* Icel. *stôll;* Gael. *stòl;* W. *ystôl*, a stool, a seat]: small seat without a back; a little form; the seat for evacuating the bowels; the act itself; the evacuations of the bowels. STOOLS, n. plu. *stôlz*, in a *ship*, small channels in the side to receive the dead-eyes of the back-stays. WINDOW-STOOL, flat piece on which the window shuts down. STOOL-PIGEON, pigeon used as a decoy.

STOOL, n. *stôl* [Manx. *sthol*, a sprout or branch: L. *stolo*, a shoot, a sucker]: stemless mother plant used for propagation by annually bending its branches into the soil; the root or stump of a timber-tree which throws up shoots; the set or cluster of shoots thus produced: V. to send out suckers. STOOL'ING, imp. STOOLED, pp. *stôld.*

STOOL OF REPENTANCE: in churches in Scotland, formerly a low stool conspicuously placed in front of the pulpit, on which persons under ecclesiastical censure fo

immoral conduct were required to sit during public worship, in profession of their penitence, or on which they stood at the close of the service to be 'rebuked' by the minister. It was familiarly called the *cutty*-stool, a term applied to small stools of similar form common in houses, but which came to be employed in conversation and in humorous verses with special reference to that which stood in the church. The S. of R., though used in some places within the 19th c., has now been completely disused, as has mostly also the practice of formal public rebuke.

STOOP, v. *stôp* [Low Ger. *stuppen*, to strike the ground with a stick in walking: Dut. *stappen*, to step, to set down the foot: Icel. *steypa*, to cast or throw down: Sw. *stupa*, to incline, to lower]: to bend the body forward; to lean forward in standing or walking; to cause to incline downward, as a cask; to yield; to submit; to condescend; to acknowledge inferiority: to come down on its prey, as a hawk; to alight from the wing: N. inclination forward; condescension; the swoop of a bird, e.g., upon its prey: in *Scot.*, a post fixed in the earth, or a prop: in *N. Y.* [from D. *stoep*] platform with steps downward from a house, usually roofed; porch (sometimes applied improperly to an extensive piazza, veranda, or portico). STOOP'ING, imp. STOOPED, pp. *stôpt*. STOOP'ER, n. *-ĕr*, one who stoops. STOOP'INGLY, ad. *-lĭ*.—SYN. of 'stoop, v.': to lean; bend, descend; cower; shrink.

STOOP, n. *stôp* [Dut. *stoop;* Icel. *staup*, a flagon or drinking-vessel (see also STOUP)]: a drinking-vessel.

STOP, v. *stŏp* [Sw. *stoppa*, to stuff, to cram: Scot. *stap* to cram: Dut. *stoppen;* Ger. *stopfen*, to stuff: It. *stoppare;* mid. L. *stupārĕ*, to stop up with tow—from L. *stupa;* Gr. *stupē*, tow]: to hinder; to impede or interrupt; to suppress; to render impassable; to close, as an aperture; to regulate the sounds of, as a musical instr., with the fingers; to cease from going forward, or from any course of action; to put an end to any course of action; to leave off, as from work: N. cessation, as of progress, motion, operation, or action; obstruction; hindrance; impediment; obstacle; one of the vent-holes of a musical wind-instr., by the opening or closing of which musical sounds may be regulated and modified (see STOP, or REGISTER): the place in a stringed instr. pressed on for production of a musical sound: point or mark in writing to distinguish a sentence or part of a sentence, and show the pauses in reading. STOP'PING, imp. closing; obstructing. STOPPED, pp. *stŏpt*. STOPPAGE, n. *stŏp'pāj*, act or state of stopping or being stopped; an obstruction; discontinuance of work; suspension of payments; deduction from pay to repay advances, etc. STOP'PER, n. *-pĕr*, one who or that which stops; cork or glass mouthpiece for a bottle: V. to close or secure with a stopper. STOP-COCK, instr. used to regulate the supply of water, gas, etc., flowing through pipes. STOP-GAP, something substituted; temporary expedient.—SYN. of 'stop, v.': to obstruct; repress; impede; restrain; delay; interrupt; cease; check; intercept.

STOP, or REGISTER: one of the different ranges of pipes in an organ. Each S. consists of a series of pipes of the same quality of tone, extending throughout the whole or a large part of the compass of the instrument, and furnished by a draw-stop or knob, the drawing out of which admits the air to the particular S., so that the keys will play on pipes of that character. Some stops give not the note which corresponds in pitch with the key struck, but a note an octave or two octaves lower, or one of the harmonics higher in pitch. Compound or mixture stops consist of more than one row of pipes to each key, corresponding to the different harmonics of the ground-tone. The stops of different organs vary greatly in number and kind. See ORGAN.

STOP'PAGE *in Tran'situ:* valuable right or privilege of a vendor of goods to resume possession, after he has parted with them under a contract of sale, and before the goods have reached the vendee; occurring when goods are consigned entirely or partly on credit from one person to another, and the consignee becomes bankrupt before the goods arrive. In such event, the consignor has a right to direct the capt. of the ship or other carrier to deliver the goods to himself or his agent instead of to the consignee, who has by bankruptcy become unable to pay for them. There are certain circumstances in which the right of S. in T. may be defeated; e.g., when the consignee indorses the bill of lading to a *bona fide* indorsee. When the vendee has appointed the carrier who is to receive the goods, their delivery to the carrier is treated for many purposes as delivery to the vendee himself; yet it is not too late for the vendor to stop the goods so long as they have not come into the actual possession of the vendee. The right of S. in T. is not allowed to a vendor unless in case of the bankruptcy of the vendee or of his stoppage of payment. Undelivered parts of a consignment may be stopped *in transitu*, and this even when the entire lot has been transferred on the books of a public store or warehouse. The right cannot be superseded by an attachment at the suit of a general creditor levied while the goods are in transit; and should the vendor attach the goods himself, he would destroy his right of S. in T. The vendor is held to have surrendered possession when he has actually delivered the goods to the vendee, his agent, or a public store or warehouse designated by the vendee; and he can bring suit for the price of the goods after he has caused them to be stopped in transit and while they are in his possession, provided he is ready to deliver them on payment of the price; and he may also resell them.

STOPPAGE OF PAY, MILITARY AND NAVAL: certain deductions from the pay of officers and men in the Brit. service, in consideration of supplies made to them, or in aid of certain institutions. In the U. S. army and navy the corresponding phrase is 'retained pay.' Officers and men are liable to have a portion of their pay 'retained' by the govt. as a punishment, and in case of desertion and a number of offenses. But the proper application of the phrase 'retained pay' is as follows.—In the *army*, the retention

of 12½ cts. per month from the pay of an enlisted man, with his consent, gives him the right when old or permanently disabled to be cared for in the National Soldiers' Home as long as he lives Besides, pay is retained on the following system: In the 1st and 2d year of a 5-year first enlistment no part of the pay is retained, in 3d year $1, 4th $2, and 5th $3 per month. In the first re-enlistment the soldier receives $2 extra per month and has $1 per month retained each year. On the honorable discharge of the soldier, the retained pay is paid to him with interest at 4 per cent. per annum. Desertion and a dishonoroble discharge forfeits this return. Clothing accounts are settled semi-annually, when balances due the govt. are charged to the soldier on the muster-roll, and balances due the soldier are carried forward on the co. books credited to his current clothing account: any balance due him at his discharge is credited to him in final settlement.—In the *navy*, all enlisted men, except musicians of the band, serving in the first period of 5 years, are entitled to $1 per month for the 3d year, $2 for the 4th, and $3 for the 5th, in addition to the regular rate of pay; and the additional amounts are retained till the expiration of service, and are paid only on final settlement and honorable discharge. All enlisted men, except the marine band, serving under a re-enlistment, have $1 per month retained and similarly settled; and all enlisted men, except musicians of the band and re-enlisted men, have $4 per month retained during the first year of their enlistment, the amount being paid with interest at 4 per cent. per annum on honorable discharge. See RATION.

STOPPLE, n. *stŏp'pl* [dim. of STOP, which see]: anything put into the mouth or neck of a bottle to stop or close it; a cork; a plug.

STOR'AGE BAT'TERY: see ELECTRICITY: ELECTRIC LIGHT: ELECTRIC RAILWAY.

STORAX, n. *stō'răks* [L. *storax, styrax;* Gr. *sturax*, a resinous gum]: aromatic resinous substance, obtained from the Storax-tree (*Styrax officinalis*), native of countries around the Mediterranean Sea; belonging to nat. order *Styracaceæ*, order of exogenous plants, containing more than 100 known species. The species are found in tropical and subtropical Asia, extending also into Europe and Africa, and in warm parts of America. In the U. S., from Va. s., in low pine barrens, are three shrubby species, the leaves with some scurf or starry down—*S. pulverulenta* having fragrant flowers. *Styrax officinalis*, which produces S. or *Gum-storax*, is a tree 15–20 ft. high, native of the Levant. S. is obtained by wounding the bark, when the gum exudes and hardens in the air. It appears in market in the form of reddish-yellow tears about the size of a pea, opaque, soft, and adhesive; or in dry brittle masses, wrapped in the leaves of a kind of reed, when it is called *S. calamita*. S. has fragrant odor and aromatic taste; is stimulating and expectorant; and was formerly much used in medicine. Benzoin (q.v.) is the product of a species of

Styrax.—The *Liquid S.* of the shops is doubtfully regarded as produced either by *Styrax officinale* or by a species of *Liquidambar* (q.v.): it seems probable that there are two kinds.

STORE, n. *stōr* [OF. *estorer*, to build, to furnish; *estoire*, provisions—from mid. L. *staurum*, store—from L. *instaurārĕ*, to repair, to restore—in mid. L. to provide or store with: comp. Gael. *stor*, riches]: large quantity; abundance, quantity accumulated; a hoard; any shop where a miscellaneous assortment of goods is sold. STORES, n. plu. *stōrz*, the necessary supplies provided; in the *army* or *navy*, a supply of provisions, clothing, etc., or of arms, ammunition, etc.: V. to supply or furnish with stores; to lay up; to hoard. STOR'ING, imp. STORED, pp. *stōrd*. STORER, n. *stōr'ĕr*, one who stores. STOR'AGE, n. *-āj*, act of laying up in a store or warehouse; price paid for safe-keeping of goods. STOREHOUSE, house expressly for safe-keeping of grain or goods; a magazine; a repository. STOREKEEPER, one who has the care of a store. STOREROOM, room in which things are stored. STORE-SHIP, vessel employed to transport stores for a fleet or for a garrison, etc. IN STORE, laid up for future use; in a state of preparation for future use.—SYN. of 'store, n.': fund; supply; plenty; accumulation; provision; magazine; warehouse.

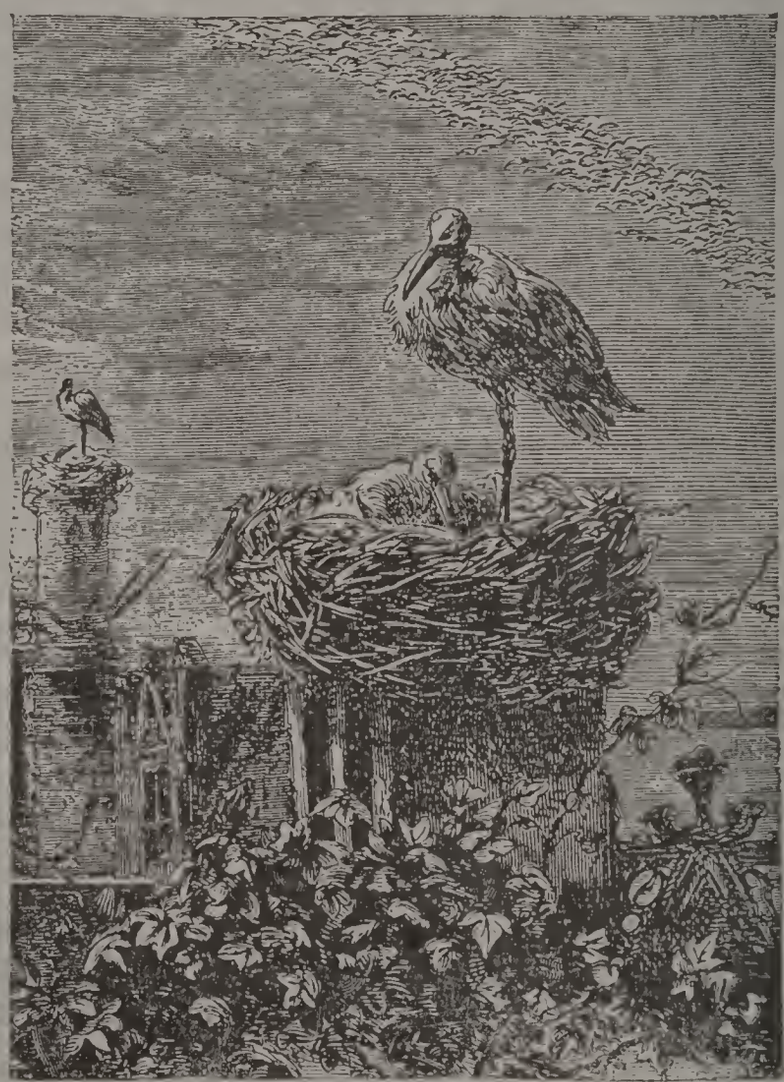
STOREY, n. *stō'rĭ*, plu. STOREYS, *stō'rĭz:* another spelling of STORY 2, which see.

STOREY, *stō'rĭ*, WILBUR FISK: journalist: 1819, Dec. 19—1884, Oct. 29; b. Salisbury, Vt. He was a journeyman printer at the age of 12, and worked in the office of the Middlebury *Free Press* 5 years. After two years in New York, he started a newspaper in La Porte, Ind.: that enterprise failed, and he kept a drug-store, and then began the study of law in Jackson, Mich. Here, too, he founded a newspaper, which he soon sold, having been appointed postmaster. On losing the post-office 1849, he again opened a drug-store, but soon quit that business—having been elected to the state constitutional convention; later he was made prison inspector. He bought an interest in the Detroit *Free Press* 1853, and before long was editor and sole owner. Removing to Chicago 1861, he bought the *Times*, which under his management attained an immense circulation. 'Circulation' was the end at which S. aimed, and he appears to have held all means right that led thither

STORIED, *stō'rĭd:* see STORY 2 and 3.

STORK, n. *stŏrk* [Dut. *stork;* Icel. *storkr;* Dan. *stork*, a stork: Fris. *staurke*, to strut], (*Ciconia*): genus of birds of the same family (*Ardeidæ*) with herons and bitterns; large birds, with long legs, four-toed, the three front toes webbed to the first joint; tail short; wings large; bill longer than the head, straight, strong, pointed, and without any groove, nostrils pierced longitudinally in the horny substance; eyes surrounded by naked skin. In some storks the whole face and throat are destitute of feathers. The species are not numerous (about a dozen), but of very wide geographic distribution. The COMMON

S., or WHITE S. (*C. alba*), is native of the greater part of the old world, a migratory bird, its range extending even to n. Scandinavia. It is common in most parts of Europe, but is especially familiar in Holland and n. Germany. The storks arrive annually in Feb. and Mar., and in autumn return to Africa in large flocks, flying mostly by night. The S. is about three and a half ft. long. The head, neck, and whole body are pure white; wings partly black; bill and legs red. The neck is long, and generally carried in an arched form; the feathers of the breast are long and pendulous, and the bird often has its bill half hidden among them. The flight is very powerful and high in the air; the gait slow, stalking, and measured. In flight the



Storks and Nests.

head is thrown back and the legs are extended. The S. sleeps standing on one leg, with neck folded, and head turned backward on the shoulder. It frequents marshy places, feeding on eels and other fishes, frogs, lizards, snakes, slugs, young birds, small mammals, and insects. It makes a rude nest of sticks, reeds, etc., on the tops of tall trees, or of ruins, spires, or houses. There are four or five eggs, white tinged with buff; and the old nest is reoccupied next year. In many parts of Europe, especially in Holland, it is a very common practice to place boxes for

storks, and it is considered a fortunate thing for a household that the box on the roof is occupied. Storks are protected by law in some countries, for their services not only in destroying reptiles and other troublesome animals, but in removal of offal from the streets of towns, in which they stalk about with perfect confidence, even amid throngs of people. They have been celebrated from ancient times for their affection for their young; and have also had the reputation—not so well founded—of showing great regard to their aged parents. Before they take their departure from their summer haunts, they congregate in large flocks, which make a great noise by the clattering of their mandibles, and are popularly regarded as holding consultation. The S. has no voice. It is very rare in Britain, and was so even before the fens of England were drained. The flesh of the S. is rank, and not fit for food.—Another species, the BLACK S. (*C. nigra*), rather smaller, plumage of the upper parts glossy black, under parts white, is common in many parts of Europe, Asia, and Africa.—The AMERICAN S. (*C. Americana*) is very similar to the Common Stork; it is common in S. America, particularly Brazil.

STORK'S-BILL: plant, named from the beak-like character of the fructification; genus *Erodĭum*, ord. *Geranĭāceæ*.

STORM, n. *stawrm* [Dut. *storm*, a rustling, a rattling: Icel. *stormr*, tempest, sedition: Ger. *sturm*, a storm: Gael. *stoirm* and *toirm*, noise]: violent outburst of one or more of the elements, wind, rain, snow, thunder and lightning (see STORMS): any violent commotion; tumultuous force; a tumult: a violent and determined assault on a fortified place: V. to attack, or attempt to take, by open force, as a fortress; to blow with violence; to rage; to be loudly angry. STORM'ING, imp.: N. the taking of a fortified place by a violent and open assault. STORMED, pp. *stawrmd*. STORMY, a. *stawrm'ĭ*, tempestuous; boisterous; violent. STORM'INESS, n. *-nĕs*, the state of being stormy; tempestuousness. STORM'ILY, ad. *-lĭ*. STORM-LIKE, a. like a storm, or having the appearance of a storm. STORM-BEAT, a. impaired by the violence of a storm. STORMY-PETREL, small black sea-bird often seen flying swiftly in the wake of a ship before or during a storm, called also 'Mother Carey's chicken.' STORM-SAIL, coarse, stronger sort of sail for gales. STORM-TOSSED, a. beaten about by storms. STORM-WINDOW, outer window to protect the inner from the effects of storms, and to preserve warmth in winter. STORMING-PARTY, party of soldiers having assigned to them the duty of first entering the breach in storming a fortress. STORM-STEAD, or STORM-STAYED, hindered or delayed in a journey from the necessity of remaining under shelter owing to the inclemency of the weather. STORM IN A TEA-CUP or -POT, much noise about little or nothing.—SYN. of 'storm, n.': tempest; hurricane; calamity; agitation; violence, tumult; clamor; distress; adversity.

STORMS: term from the root of *stir*, signifying properly, not every fall of rain or snow, but more or less violent disturbances of the atmosphere, usually producing rain, snow, or hail, and often thunder and lightning. A storm is more than a passing gust, and, when extreme, is called a tempest. There are local, and the more extensive or regional storms. In the tropics occur the typical local storms; that is, such are local in cause, though the same conditions may produce similar phenomena over a wide region. They are the diurnal thunder storms, coming punctually a while after noon, though the morning may be cloudless, and are due to the large ascent of moist heated air, resulting in heavy precipitation from the chilling effect of the higher atmosphere. Similar local storms, with thunder, may occur in hot weather in the temperate zones, usually later in the day; sometimes on the prairies they continue all night with incessant lightning; but they are often connected with a wide area of barometric depression, with either the possibility or the neighboring actuality of an extensive cyclonic storm. Sometimes the local or the more general storm is violent but rainless, and is then known as a wind-storm, or dust-storm, and the word is even applied to violent disturbances of the magnetic needle, called magnetic storms, often interfering with telegraphic communication, and referred to solar disturbances.

Atmospheric storms, even when local, n. of the tropics and trade-wind belt, tend to move easterly in the n. hemisphere, in accordance with the general movement of winds; and are frequently developed over bodies of water or along water-courses, where evaporation is greatest. Stormy conditions have been seen to manifest themselves lightly just e. of the Rocky Mts., but to increase speedily and powerfully in their progress a little farther e. toward the moister Mississippi valley. A local storm is perhaps best distinguished from those due to extensive cyclonic conditions by the absence of succeeding cold w. winds, which attend such conditions; it is often remarked that the weather is even more oppressive after the local storm. In contrast with these summer phenomena are the 'northers' of the cooler seasons of the year, when, perhaps for days, there is a downrush of cold wind (with or without snow) from the n. central parts of the continent, due apparently to disturbed equilibrium over a wide extent southward.

The great cyclonic storm (see CYCLONE) are developed first in the tropics or warmer zones. In the northern hemisphere they move slowly westward, recurring when near the limit of the prevailing westerlies, s.e. over the Antilles in the Atlantic and the Philippines in the Pacific, and then moving n. and e. In the southern hemisphere the recurvature is from w. to s. and thence e. In n. and central Europe, storms pursue the same general n.e.

direction. As the weather-maps of the U. S. weather bureau are publicly posted at many points, we subjoin for comparison, and for illustration, a chart of Europe, showing, from actual observations at more than 100 localities on that continent, the barometric pressure, and

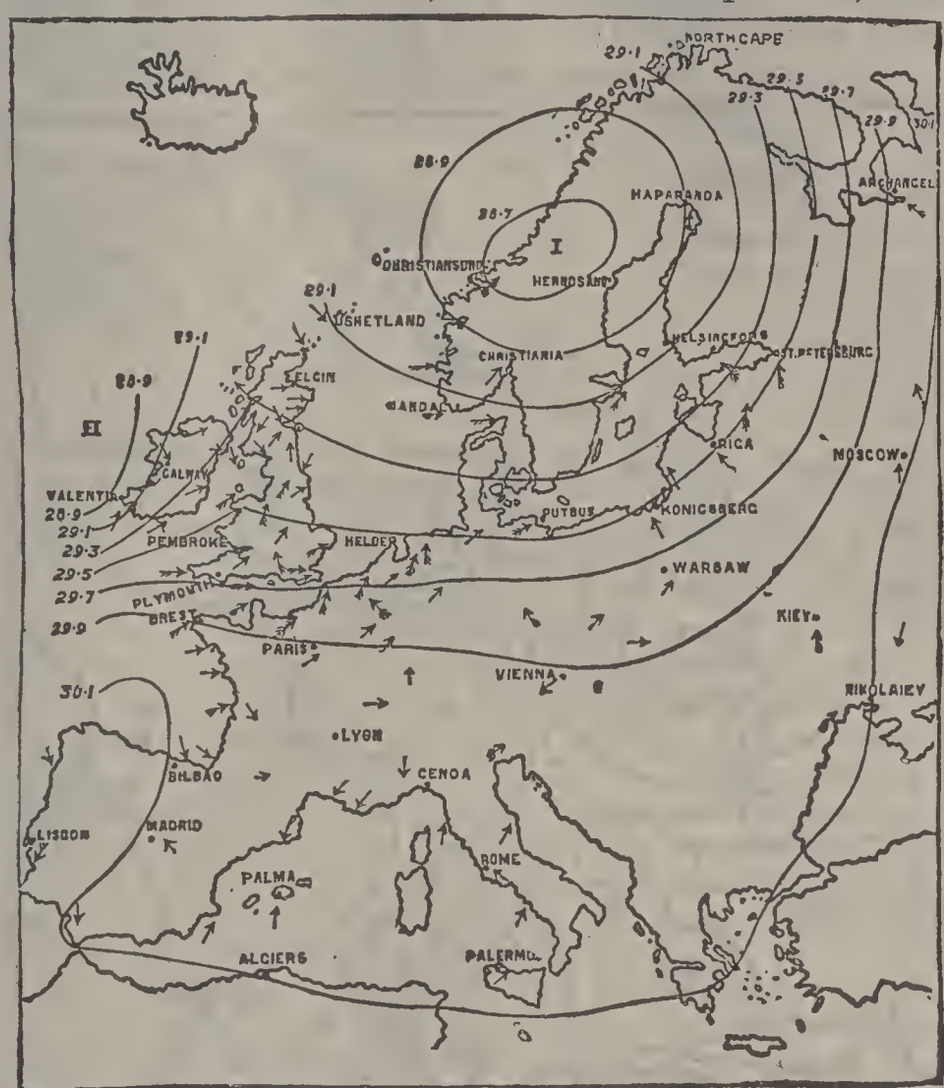


Fig. 1—European Storm Map.

direction and force of the wind at 8 A.M., during part of the course of a storm which passed over Europe at that time. The isobaric lines, or lines showing where, at the above hours, the height of the barometer was the same, are given for every two-tenths inch in the difference of the pressure. The arrows show the direction of the wind, being represented flying with it. The force of the wind is shown (1) by plain arrows, which represent light and moderate winds; (2) by arrows feathered on one side only, which represent high winds; (3) by arrows feathered on both sides, which represent strong gales, storms, or hurricanes.

The mean atmospheric pressure, at the level of the sea, may be stated at 29.92 inches. The terms 'low' and 'high' are used by meterologists to indicate pressures below and above the normal or sea level pressure.

The circular isobaric lines on the charts represent the

general shape which storms assume. The area of almost every storm is either circular or elliptical, and when elliptical, the major axis of the ellipse seldom exceeds twice the length of the minor axis. The outline is occasionally very irregular, but in such cases the storm tends to part into two or more distinct storms, which remain separate for some time and perhaps then reunite.

Fig. 2.—European Storm Map.

This circular form of storm, which an examination of hundreds, especially in Europe, has shown to be their general characteristic, is a most important feature, whether as determining the practical rules for the guidance of sailors in storms, or for the forecasting of storms at particular seaports, in regard to the direction from which they may be expected, and the veering of the winds during their continuance. The extent over which storms spread themselves is very variable, being seldom less than 600 m. in diameter, but often two or three times that amount, or even more. Almost the whole of Europe is sometimes overspread by a single storm at one time. The area of storms is not constant from day to day; but varies in size, sometimes expanding and sometimes contracting. And it is worthy of remark, that usually when

a storm contracts its area, the central depression gives signs of filling up, and the storm of dying out. On the other hand, when it increases in extent, the central depression may become deeper; the storm increases in violence, and occasionally is broken up into two, or even three, depressions, which become separate storms, with the wind circling round each.

By the *direction* of a storm is meant, not the direction of the wind, but the path followed by the centre of disturbance. The direction in which their progressive motion takes place differs in different parts of the world—being probably determined by the prevailing winds: see WINDS. Thus, about half the storms of middle and n. Europe travel from s.w. toward the n.e.; and 19 out of every 20, at least, travel toward some point in the quadrant from the n.e. to the s.e. Storms do not always proceed in the same uniform direction from day to day; and though the change in the direction of their progressive motion is usually small, yet occasionally it is very great. Many of the storms of the Mediterranean proceed from the n. to the s., influenced probably by the heated air rising from the Sahara; a considerable number proceed from the e. and pass w. over Greece and Italy to the Alps; and a very few are observed to travel easterly.

The storms of the West Indies generally take their rise near the region of calms, and tracing out a parabolic course, proceed first toward the n.w., and then turn to the n.e. about 30° n. lat., many of them traversing the e. coasts of North America as far as Nova Scotia. South of the equator they follow an opposite course. Thus, in the south Atlantic and Indian Ocean, they first proceed s.w., and then gradually curve round to the s.e.

Velocity of Storms.—C. F. von Herrmann has given the following from weather bureau records covering period 1878 to 1904, for the velocity of storms in the United States in miles per hour: Jan., 34.8; Feb., 34.8; March, 31.6; April, 26.9; May, 24.3; June, 24.0; July, 24.4; August, 24.6; Sept., 24.8; Oct., 27.4; Nov., 30.7; Dec., 34.9; year, 28.6.

The general eastward motion of the earth's atmosphere increases gradually upward from the earth's surface.

Bigelow in 'International Cloud Report' states that the maximum development of cyclones takes place at an elevation of from three to four miles, where the progressive motion of the air must be considerably greater, in fact agreeing closely with the speed of whirlwinds at the surface. The difference between summer and winter velocities is quite marked, the ratio of the means during the two seasons is in round numbers 24 to 35, or nearly 1 to 1½.

The mean rate of progress of cyclones over the United States is greater than over the Atlantic or in Western

Europe. The rates are: United States, 28.6; Atlantic Ocean, 18.1; Western Europe, 16.8. The explanation is that there is less moisture over U. S. and the plane of condensation is higher and maximum storm formation is, therefore, at a higher level. The mean velocity of anti-cyclones in U. S. is 26.5 m. The maximum is in January and minimum in August, 22.1.

The typhoons of the China seas, or as they are now called by meteoroligists, 'bagnios,' from the Philippine word bagnio, are now carefully studied and warnings of their approach widely disseminated by the observatories at Manila, Hong Kong, Shanghai and Tokio. They are similar in origin and motion to West Indian hurricanes.

The New York storm known as the 'Blizzard' of 1888, Monday, March 12, is an example of extreme conditions which may recur, and threatened to repeat themselves once at least in 1891. The accompanying map gives the conditions precedent on Sunday, the 11th. The areas marked 'low' are storm centres. On the same map is shown, in lines of crosses and circles, the progress of the centre of the storm, from just s. of San Francisco on the 7th, until it disappeared off Nova Scotia on the 14th. It was at Colorado Springs on the 8th, 10 P.M. (as indicated by *X* below the circle); and, a little e. of there, it lingered and apparently divided in the night, one branch of the storm proceeding n.e. to the great lakes, while the other moved through the southern states, the centre arriving near Wilmington, N. C., on the 11th, 3 P.M. Between this hour and 10 P.M. (when the centre was off Norfolk, Va.) the two storms—the other centred between lakes Ontario and Huron at 7 A.M. as on map—appear to have been drawn together, the latter joining the former, which centred off New York at 7 A.M. on the 12th, the snow having begun seven hours previously as result of the cold following the northern branch storm. At 3 and 10 P.M. and also on the 13th at 7 A.M. the storm-centre was almost stationary, moving slightly w. from Martha's Vineyard to R. I., as shown by three intersecting circles: the opinion is that it was held back by the 'banking up' of dense air (in other words the persistent position of an anti-cyclone) over the Gulf of St. Lawrence. The resistance gave way, so that on the 14th the cyclone had rapidly moved its centre to the e. of Nova Scotia, apparently passing into that peninsula, however, before it disappeared over the Atlantic. The junction of two storms (the northern one bringing severe cold, 8° Fahr. in New York, and heavy snow-fall, (interfering greatly with travel, traffic, and business for days), and the nearly stationary position of the storm in the vicinity of New York two days, are the remarkable facts. On the map, the many local signs of wind and weather are omitted as confusing on so small a scale

STORMS.

Storms travel with less velocity over the ocean than over land. Within the tropics, the onward motion of storms sometimes rise to 40 m. an hour; at other times the rate of motion is so slow as to be almost stationary.

The temperature increases at places toward which and over which the front part of the storm is advancing, and falls at those places over which the front part of the storm has already passed—i.e., the temperature rises as

the barometer falls, and falls as the barometer rises. When the barometer has been falling for some time, clouds begin to overspread the sky, and rain to fall at intervals; as the central depression approaches, the rain becomes more general, heavy and continuous, and corresponding to the atmospheric depression at the place where it falls. After the centre of the storm has passed, or when the barometer has begun to rise, the rain becomes less heavy, falling more in showers than continuously; the clouds break up, and fine weather, ushered in with cold breezes, ultimately prevails. If the temperature begins to rise soon and markedly after the storm has passed, a second storm may be expected shortly, except in the case of local storms.

As to the direction of the winds in a storm, in the n. hemisphere they will be observed whirling round the area of low barometer in a circular manner, and in a direction contrary to the motion of the hands of a watch, with—and be this particularly noted—a constant tendency to turn toward the center of lowest barometer. The wind in storms neither blows round the center of lowest pressure in circles, nor does it blow directly toward that centre, but takes a direction nearly intermediate, approaching, however, nearer to the direction and course of the circular curves than of the radii to the centre. Where the direction of the wind differs to any material degree from this general law, it is light, and consequently more under local influences, which turn it from its course. The winds circulate round the centre of least pressure, or, more accurately, the whole atmospheric system flows in on the centre in a spiral course. In the s. hemisphere, also, a rotatory motion is observed round the centre of the storm, but in a contrary direction, or in the direction of the motion of the hands of a watch.

As a rule the winds blow from a high to a low barometer, and with a force proportioned to the difference of the barometric pressures. Hence, where the isobars crowd together, the violence of the storm is most felt, and where they are far asunder, the winds are moderate and light. We thus see the importance of observations from a distance in forecasting the weather. As the wind nears the centre of the storm, it gradually abates, till on reaching the centre a lull or calm follows. Calms and light winds also prevail along the ridge of highest barometer, or the region where the pressure is greatest.

Tornadoes are secondary storms, usually of small area, formed in the s. or s.e. quadrant of the larger general whirl or cyclone. Newspapers frequently misuse the terms cyclone and tornado. The tornado is the storm which is so destructive in parts of the U. S. Storms may be classified according to size, beginning with the smallest: (1) Dust whirls; (2) water spouts; (3) whirlwinds; (4) thunder-storms; (5) tornadoes; (6) typhons, bagu-

ios or hurricanes, all types of cyclones.—See METEOROLOGY; CLOUDS; WIND; RAIN; HAIL; LIGHTNING; CYCLONE; TORNADO; BAROMETER; THUNDER-STORM; WHIRLWIND; WATERSPOUT, etc.

STORNELLO-VERSES, *stŏr-nĕl'lō-* [It. dim. of *storno*, a thrusting or turning aside]: poetical verses in which the same word or words are frequently repeated and harped upon.

STORRS, *stōrz*, CHARLES BACKUS, D.D.: 1794, May 15—1833, Sep. 15; b. Longmeadow, Mass.; brother of Dr. Richard Salter Storrs (1787-1873). After three years at Princeton Coll., he studied theology in Bridgehampton, L. I., graduating at Andover Theological Seminary 1820. He did missionary work in S. C. and Ga., was pastor at Ravenna, O., 1822-28, and prof. of theol. and the first president of Western Reserve Coll. from 1831 till his death.

STORRS, HENRY MARTYN, D.D., LL.D.: 1827—1894, Dec. 1; theologian; b. Ravenna, O.; son of Charles Backus Storrs. He graduated at Amherst 1846, and at Andover Theol. Seminary; was pastor in Lawrence, Mass., 1852-55, Cincinnati, O., 1855-67, and of the South Congregational Church, Brooklyn, N. Y., 1867-72; and was corresponding secretary of the American Home Missionary Society, New York, 1872-82, and 1882 till his death pastor of the First Presbyterian Church, Orange, N. J. He published various articles, sermons, and addresses. He was sent as delegate to the Congregational Union in England, where his addresses made great impression. He delivered one of the courses of lectures in the Lyman Beecher lectureship in the Divinity School of Yale University.

STORRS, RICHARD SALTER, D.D., LL.D.: 1787, Feb. 6—1873, Aug. 11; b. Longmeadow, Mass.: Congregational minister. His father, Richard Salter Storrs, was pastor in his native place, and his grandfather, John Storrs, was chaplain in the revolution. He was educated in part at Yale, graduating at Williams Coll. 1807. After studying theology with the Rev. Aaron Woodworth of Bridgehampton, L. I., he preached in Islip and Smithtown, L. I.; graduated at Andover 1810, and was pastor in Braintree, Mass., until his death. From 1817-25 he edited the *Boston Recorder*, and was one of the editors of the *Congregationalist* 1850-56. He was noted for spiritual fervor and intellectual ability; and was one of the leaders in his denomination. Besides numerous sermons and contributions to periodicals, he published *Memoir of Rev Samuel Green* (1836), and *Life and Letters of Rev. Daniel Temple* (1855).

STORRS, RICHARD SALTER, D.D., LL.D., L.H.D.: Congl. minister and orator: b. Braintree, Mass., 1821, Aug. 21; d. 1900, June 5; son of the Rev. Dr. Richard Salter Storrs (1787-1873). He graduated at Amherst College

in the class of 1839, which numbered Bishop Huntington, Father Hewitt, and others of note. After teaching in Munson and Williston Academies (Mass.), he studied law in Boston with Rufus Choate, but turned to theol., graduating at Andover 1845. A year's pastorate of the Harvard Church (Congregational), Brookline, Mass., was followed by acceptance of a call 1846 to the then new Church of the Pilgrims (Congregational), Brooklyn, N. Y. With large learning and superlative culture, he was characterized especially by richness and magnificence of thought that naturally utters itself in splendor of diction. He was associate editor of the *Independent* 1848-61; from 1873 president of the Long Island Historical Society, and 1887-1897 of the American Board of Missions. He received the degree D.D. from Union College, and from Harvard University; LL.D. from Princeton; L.H.D. from Columbia. He was a constant contributor to the press, but his separate publications were volumes of lectures, and occasional addresses and orations. Of the lectures are those on *The Wisdom, Power, and Goodness of God, as manifested in the Constitution of the Human Soul* (1856); *Conditions of Success in Preaching without Notes* (1875); and *The Divine Origin of Christianity* (1881), given at Union Theol. Seminary, New York, and before the Lowell Institute, Boston. Among the addresses are, *Appeal of Romans to Educated Protestants* (1873); *Early American Spirit and the Genesis of It* (1875); *Declaration of Independence and the Effects of It* (1876), New York Centennial oration; *Recognition of the Supernatural in Life and Letters* (1881), *φ B K* oration; *Manliness of the Scholar* (1883); *Divine Origin of Christianity indicated by Its Historical Effects* (1884); *The Prospective Advance of Christian Missions* (1885); *Forty Years of Pastoral Life* (1886); *The Broader Range and Outlook of the Modern College Training* (1887); and *The Puritan Spirit* (1890).

STORTHING, n. *stŏrt'ĭng* [Dan. *stor*, great; *thing*, a court]: the legislative assembly of Norway. Its members are elected by manhood suffrage. Every native Norwegian of 25 years of age who is a burgess of any town, or possesses property in land to the value of $160, if 30 years of age, is eligible. When the Storthing is in session, every member is paid an allowance equivalent to about $3.25 per day. When elected, the Storthing meets of its own authority without writ from the king, and divides itself into two chambers, the *Lagthing* and the *Odelsthing*, the former composed of one-fourth, the latter of the remaining three-fourths of the members. Since 1869 the sittings have been annual.

STORY, *stō'rĭ*, JOSEPH, LL.D.: renowned jurist and judge: 1779, Sep. 18—1845, Sep. 10; b. Marblehead, Mass.; son of a member of the Boston tea-party, who was also surgeon in the revolutionary army. He was educated at Harvard College, and admitted to the bar 1801.

Having early given attention to literature and poetry, he published, 1804, *The Power of Solitude,* and other poems—a volume which he afterward regarded as a youthful mistake. Elected to the state legislature 1805, he became the leader in Massachusetts of the republican, or, as it was afterward called, the democratic party; though in national politics his later views were largely those of Washington and Hamilton. In 1808 he was elected to congress where he gave moderate support to the war measures of Pres. Madison, who, however, 1811, appointed him associate justice of the supreme court of the United States, his age being only 32 years. In admiralty, salvage, insurance, and prize law, also in patent law—departments till then ill-defined—his decisions did much to create the law as now administered. With Chancellor Kent, Story founded the U. S. equity jurisprudence; and with Chief-justice Marshall he developed the full constitutional powers of the U. S. supreme court. In 1829 he became law professor at Harvard, and removed his residence to Cambridge. Under Story, the Harvard Law School immediately rose to be one of the chief seats of legal learning. His genial and merry disposition, with his frank and familiar manner, joined with his great erudition to make him a favorite with his students.

On his election as one of the overseers of Harvard College 1818, that university conferred on him the degree LL.D., and later he received the same honor from Brown and from Dartmouth.—Besides the works on laws and constitutions named above, Story wrote several legal text-books—among them, *Commentaries on Equity Jurisprudence,* noteworthy as the first systematic treatise on that subject, and volumes on *Equity Pleadings,* on the law of *Agency,* of *Partnership,* of *Bills of Exchange,* and of *Promissory Notes.* Two volumes of *Miscellaneous Writings* contain selections from his discourses and essays on literary, historical, political, and other questions. He left in MS. a voluminous *Digest of Law.* See *Life,* by his son, William W. Story.

STORY, n., or STOREY, n. *stō'rĭ,* STO'RIES and STO'REYS, n. plu. *-rĭz* [probably from OF. *estorer,* to construct, to build (see STORE)]: a single stage or floor of a high building; a division of a house reached by one flight of stairs; a flat. STO'RIED, a. *-rĭd,* having stages or floors reached by flights of stairs, as two-*storied.*

STORY, n. *stō'rĭ,* plu. STO'RIES, *-rĭz* [F. *histoire,* history—from L. *historĭa,* relation]: narration of a series of facts or incidents; written narrative of events; history; a short or trifling tale; a fiction; a falsehood; a fib: V. in *OE.,* to tell after the manner of history; to narrate. STO'RIED, a. *-rĭd,* told or recited in history; adorned with historical paintings. STORY-BOOK, a book containing entertaining narratives, either true or merely fiction. STORY-TELLER, a relater of stories; a teller of falsehoods.

STORY-TELLING, the habit or amusement of telling stories; the act of fibbing.

STORY, WILLIAM WETMORE, D.C.L.: sculptor: b. Salem, Mass., 1819, Feb. 12; d. 1895, Oct. 7; son of Judge Joseph Story. He graduated at Harvard 1838, and from the law dept. 1840. He published U. S. First Circuit Reports 1842-47; *Treatise on the Law of Contracts Not under Seal* (1844); *Treatise on the Sale of Personal Property* (1847); he wrote also verse and literary prose. After 1848 he applied himself to art, residing in Rome, where he was an academy professor. Among his works are a statue of his father at Mt. Auburn, of Edward Everett in Boston, of George Peabody in London and Baltimore; and ideal statues, especially of famous women of antiquity, such as the *Cleopatra* and *Semiramis* in the New York Metropolitan Museum. He published *Life and Letters of Joseph Story* (1851); *The American Question* (1862); *Roba di Roma* (1862); *Proportions of the Human Figure* (1866); *Graffiti d'Italia* (1869); *The Roman Lawyer in Jerusalem* (1870); *Tragedy of Nero* (1875); *Castle of St. Angelo* (1877); *He and She: a Poet's Portfolio* (1883); *Fiammetta* (1885); *Poems* (1856, and 2 vols. 1886); *Conversations in a Studio* (1890).

STOT, n. *stŏt* [see STOAT: Sw. *stut*, a bull]: in *Scot.*, a young bullock or steer; in *OE.*, a stallion.

STOTHARD, *stŏth'ẽrd*, THOMAS, R.A.: designer and subject-painter: 1755, Aug. 17—1834, Apr 27; b. London; son of an inn-keeper, who kept the *Black Horse* in Long Acre. He received a respectable education in boarding-schools; and on his father's death, having shown taste for art, was bound apprentice to a pattern-drawer, but was released from his engagement and betook himself to more artistic work. His first notable effort was a series of designs for the *Town and Country Magazine*, followed by his imaginative compositions for Bell's *British Poets* and the *Novelist's Magazine*. The popularity of these was so great that for many years his services were constantly in request by the leading publishers in London. His earliest pictures at the Royal Acad. were *The Holy Family*, and *Ajax Defending the Body of Patroclus*. In 1791 he was chosen an associate, 1794 a member, and 1813 librarian of the acad. He died in London. Stothard was an admirable and facile illustrator. His designs have been estimated to number 5,000; and about 3,000 have been engraved; but his paintings, though gracefully 'composed' and finely colored, lack the originality that accompanies a study of nature, and resemble enlarged 'illustrations' for books. In the tragic and heroic, his success was not great. Perhaps the best known and most agreeable of his sets of illustrations is *Canterbury Pilgrims* 1817; others are the *Flitch of Bacon*, the *Fête Champêtre*, and the paintings executed

for the staircase at Burleigh, seat of the Marquis of Exeter.—See Mrs. Bray's *Life of Thomas Stothard, R.A., with Numerous Illustrations from his Works* (1851).—His son, CHARLES ALFRED STOTHARD (1786-1821), acquired great reputation as antiquarian draughtsman.

STOUGHTON, *stō'ton*, ISRAEL: born in England; d. 1645. He removed to Mass., becoming a citizen of Dorchester 1633, was a member of the general court 1634-37, meanwhile published a political pamphlet which for a time made him unpopular, was prominent in the expedition against the Pequot tribe 1637, and afterward commanded an artillery company. For several years he was assistant governor of Mass., was practically the governor of N. H. 1641, was in England 1642-44, returning in the latter year, was lieut.-col. of a prominent regiment, and was a benefactor of Harvard College. He died in England.

STOUGHTON, WILLIAM: 1632, May 30—1701, July 7; b. England: preacher and civilian official. He studied theol. in the Massachusetts colony at Harvard College; was fellow of Oxford University, returned to the colony 1662; was Massachusetts colonial agent in England 1677-79, member of Gov. Andros's council, and of the council of safety that deposed the governor; was lieutenant-governor 1692 (until his death), and from the same year chief-justice of the superior court; and acting governor 1695. As judge he justified always his condemnation of witches. As occasional preacher he was in high esteem. He gave £1,000 to Harvard College and a legacy of land, hence Stoughton Hall 1698, rebuilt 1805. He died in Dorchester.

STOUGHTON, WILLIAM LEWIS: lawyer: 1827, Mar. 20—1888, June 6; b. New York. In early life he went to Mich., studied law, began practice 1851, became public prosecutor 1854, and was appointed U. S. district attorney 1861, but soon resigned to become lieutenant-colonel of a Mich. regiment of Union volunteers. He served at various points in the w. and s., and lost one of his limbs at the battle of Ruff's Station. He was brevetted brigadier-general and major-general of volunteers, was attorney-general of Mich. 1866, and member of congress 1869-73. He died at Sturgis, Mich.

STOUND, v. *stownd* [Dan. and Sw. *stund*, a space of time: Scot. *stound*, a sharp pain affecting one at intervals]: in *OE.*, to be in pain or sorrow: N. a sudden severe pain or grief; a pang; in *OE.*, noise; astonishment; time; season.

STOUND, *stownd:* for ASTOUND, which see.

STOUP, or STOOP, n. *stôp*, in Scot. *stowp* [Dut. *stoop;* Ger. *stauf;* Icel. *staup*, a flagon or drinking-vessel: Gael. *stòp* and *stuip*, a wooden vessel for holding liquor]: a flagon; a basin for holy water at the entrance of a Rom. Cath. Church. STOUP, n. *stowp*, in *Scot.*, a measure or vessel for liquids.

STOUR, n. *stôr* [OF. *estour*, dust: AS. *styrian*, to stir]: in *OE.*, an assault; a tumult; in *Scot.*, dust in a state of motion.

STOUT, a. *stowt* [OF. *estout;* Low Ger. *stolt;* O. Dut. *stout*, stout, rash: Ger. *stolz*, proud]: lusty; corpulent; robust; strong; intrepid; valiant: N. strong porter. STOUT'LY, ad. *-lĭ.* STOUT'NESS, n. *-nĕs*, the condition of being stout; strength; courage; bulkiness; corpulence; in *OE.*, obstinacy; stubbornness. STOUT-BUILT, or STOUT-MADE, a. having a strong frame of body. STOUT-HEARTED, a. brave.—SYN. of 'stoutness': bulkiness; strength; bulk; valor; force; courage; lustiness; brawniness; boldness; fortitude.

STOUTHRIEFF, *stowth'rēf*, in Scottish Law: robbery in a dwelling-house.

STOVE, n. *stōv* [Icel. *stofa*, a stove, a bath: O. Dut. and Low Ger. *stove*, a stove: It. *stufa;* OF. *estuve*, a stove, a hot bath]: inclosed fireplace, or structure of iron or other material, in which fuel may be burned for heating an apartment, or for cooking (see WARMING AND VENTILATION: HYPOCAUST: FUEL: COMBUSTION): in *hort.*, hothouse; room or space artificially warmed (see BARK-STOVE: DRY STOVE): V. to heat or dry, as in a stove: in *Scot.*, to cook; to stew. STO'VING, imp. STOVED, pp. *stōvd.*

STOVE, v. *stōv* [pt. of STAVE, which see]: broken or burst in, as a hole in a ship.

STOVER, n. *stō'vėr* [OF. *estover*, necessaries, provisions]: fodder for cattle; straw or coarse hay.

STOW, v. *stō* [Dan. *stuve;* Dut. *stouwen;* Gr. *stauen*, to thrust wares together in packing: L. *stīpārĕ*, to pack together: Gr. *steibein*, to tread tight]: to place; to lay up; to arrange and pack. STOW'ING, imp. STOWED, pp. *stōd.* STOWAGE, n. *stō'āj*, act or operation of laying compactly; room for being laid up; money paid for stowing goods. STOW'AWAY, n. *-ă-wā*, one who conceals himself on board an outgoing vessel to secure a free passage.

STOW, v. *stow* (Sw. *stuf;* Low Ger. *stuw*, a remnant]: in *prov. Eng.* and *Scot.*, to lop or top trees.

STOW, *stō*, JOHN: one of the earliest and most diligent of English antiquaries: 1525-1605, Apr. 6; b. London. He was brought up to his father's trade of tailor in Cornhill, but abandoned it for antiquarian pursuits. Writing 1575, he says: 'It is now ten years since I, seeing the confused order of our late English chronicles, and the ignorant handling of ancient affairs, leaving mine own peculiar gains, consecrated myself to the search of our famous antiquities'—a patriotic sacrifice, which ought to have brought him from his king and country an old age of ease and honor, but which brought him only want and beggary. However, he was cheerful in his poverty. In his 79th year, Stow obtained letters

patent from James I. authorizing him to become a mendicant, or, as it is expressed in the state document, 'to collect amongst our loving subjects their voluntary contributions and kind gratuities.' He died soon afterward, and was buried in the parish church of St. Andrew Undershaft, in Aldgate Ward, where his monument of terra-cotta, erected by his widow, may still be seen. Stow's antiquarian researches caused his collection of what the ecclesiastical authorities called 'many dangerous and superstitious books;' and Grindal, Bp. of London, searched his premises for books 'in defense of papistry;' but Stow seems to have proved his Protestant soundness. The principal works of Stow are: *Summary of Englische Chronicles,* 1561, subsequently reprinted every two or three years with continuation to the date of each new publication; *Annales, etc., of England,* 1580, reprinted 1592, 1601-05, with continuation to the last year; and *A Survey of London,* 1598, the most important of his writings. Besides these original works, Stow assisted in the continuation of Holinshed's Chronicle, Speght's ed. of Chaucer, Leland's *Collectanea,* etc. He had collected or transcribed a vast number of MSS., and much valuable information which might otherwise have perished; and in the use of his stores he was liberal to others, while as an original historian he was faithful and impartial.

STOW, *stō,* or STOKE, *stōk* [AS. *stoc.* a stockaded place]: component element in many names of places, e.g.: Bristow or Bristol, Stockholm.

STOWE, *stō,* CALVIN ELLIS, D.D.: 1802, Apr. 6.—1866, Aug. 22; b. Natick, Mass.: educator and biblical scholar. Lacking financial means, he was assisted to gain an education; graduated at Bowdoin College; finished his theol. studies at Andover Theological Seminary 1828, and was subsequently an assistant there of Prof. Moses Stuart, meanwhile doing editorial work for the Boston *Recorder.* He was professor of languages in Dartmouth College 1830, and professor of biblical literature in Lane Theological Seminary, Cincinnati, 1830-50. He did much to promote the common-school system in Ohio, and, after visiting Europe, published a widely distributed state report on *Elementary Education in Europe,* followed by two reports on elementary education in Prussia, and one on education of immigrants. He became professor of divinity in Bowdoin College 1850; and of sacred literature in Andover Theological Seminary 1852, which position he held until his resignation on account of failing health 1864, when he removed to Hartford, Conn., the place of his death. He married Harriet E. Beecher Stowe (his second wife) 1836. He had an active and fertile mind, and as a scholar and occasional preacher he had wide recognition. While in the theological seminary, he translated Jahn's *Hebrew Commonwealth;* and while

editor, Lowth's *Lectures on the Sacred Poetry of the Hebrews* (1829). He published, besides addresses and many review articles, *Introduction to the Criticism and Interpretation of the Bible* (1835), and the *Origin and Hist. of the Books of the Bible,* including Apocrypha (1867).

STOWE, HARRIET ELIZABETH (BEECHER): authoress: b. Litchfield, Conn., 1812, June 14; d. 1896, July 1; 3d daughter and 6th child of Lyman Beecher, D.D., and wife of Prof. Calvin E. Stowe, D.D., whom she married 1836. Her early education, stimulated by the intellectual atmosphere of her home, was pursued at Litchfield Academy, and, from her 13th year, at Hartford, where she continued until 1832. As a child she became interested in poetry, theology, and reform, anti-slavery especially; and showed much ability in prose and poetic composition, and acquisition of languages. At the age of 14 she was engaged with her elder sister, Catherine, as teacher in a girl's school in Hartford, having a class in Butler's *Analogy.* After her marriage she was much affected by the anti-negro riots in Cincinnati. She became a frequent contributor to periodicals, published some stories in a volume entitled *The May-flower* (1849), and other spirited juvenile stories for Sunday school libraries. The ability of Mrs. Stowe as a delineator of character, especially New England character, was known to many; but her full power was not suspected until, 1851, she began in *The National Era,* anti-slavery paper at Washington, a serial tale, *Uncle Tom's Cabin.* When completed 1852, it was published at Boston; and its popularity was so immense that it soon sold in four stereotype editions to the extent of 400,000 copies. The English reprints are estimated to have circulated 500,000; and it was rapidly translated into all European and some Asiatic languages, no less than 20 in all, and was extensively dramatized and illustrated. In 1853 she published a *Key to Uncle Tom's Cabin,* and visited Europe, where she was received with distinguished consideration. The events and impressions of this triumphant tour are recorded in her *Sunny Memories of Foreign Lands* (2 vols. Bost. 1854.) In 1856 she published *Dred: a Tale of the Dismal Swamp,* another anti-slavery story, which had wide circulation. This was followed 1859 by *The Minister's Wooing,* a story of New England life in the 18th century; etc. In 1869 Mrs. Stowe contributed to *Macmillan's Magazine* an article entitled *The True Story of Lady Byron's Life* —some statements in which, impugning the character of Lord Byron, called forth stormy criticism, and occasioned her reply (1870), *Lady Byron Vindicated.* Mrs. Stowe was 1868-70 joint-editor of *Hearth and Home.* She contributed to the *Independent* and other journals. Her other publications include: *The Pearl of Orr's Island,* and *Agnes of Sorrento* (1862); *The Ravages of a Carpet,*

and *House and Home Papers* (1864); *Religious Poems, Stories about Dogs,* and *Little Foxes* (1865); *The Chimney Corner* (1868); *Men of Our Times* (1868); *Old-Town Folks* (1869); *Pink and White Tyranny,* and *Sam Lawson's Fireside Stories* (1871); *My Wife and I* (1872); *Palmetto Leaves* (1873); *We and Our Neighbors* (1875); *Footsteps of the Master* (1876); *Bible Heroines,* and *Poganuc People* (1878); *Queer Little People* (1881).

STOWELL, *stō'ĕl,* CHARLES HENRY: American physiologist: b. Perry, N. Y., 1850, Oct. 27. He was graduated from the Genesee Wesleyan Seminary in 1868 and from the medical department of the University of Michigan in 1872, where he became lecturer and professor of physiology 1876-85. He has published, *Primer of Health; A Healthy Body; Microscopical Diagnosis; Structure of Teeth.*

STOWELL, *stō'ĕl,* WILLIAM SCOTT, D.D., Lord: one of the most eminent of English judges: 1745, Oct. 17—1836, Jan. 28; b. Heworth, Durham; eldest brother of Lord Chancellor Eldon; and son of a tradesman in coal. He was educated at Newcastle; entered Corpus Christi, Oxford, 1761, and became a college tutor. In 1779 he took the degree D.C.L., removed to London, was called to the bar (1780) and admitted to the faculty of advocates at Doctors' Commons. Dr. Johnson introduced him to the Literary Club, and he became well known in the most intellectual society of London. As an advocate he at once obtained large practice, and his promotion was rapid. In 1788 he was appointed judge in the consistory court, knighted, and nominated a privy councilor. In 1798 he became judge of the high court of admiralty, the highest dignity in his branch of the profession. Both as ecclesiastical and as admiralty judge he won high distinction. He wrote no systematic treatise or text-book, but his judgments were admirably reported, and fully evince his extensive legal learning, his sagacity, and his great literary ability. He is the highest English authority on ecclesiastical law and on international law; and his decisions are at least presumptive evidence of international law in the United States. His judgments—those, especially, relating to the rights of belligerents and neutrals—have been described as the most valuable contribution by an English judge to general jurisprudence since the time of Lord Mansfield. As a politician Stowell was not remarkable. He represented Oxford in the house of commons 20 years, but took no part in the business of parliament, though, like his brother, he was a zealous supporter of the conservative party and the established church. At the coronation of George IV. he was raised to the peerage under the title Baron Stowell of Stowell Park. In 1827 he retired from the bench, with gradually failing mental faculties.

STRABISMUS, n. *strā-bĭz'mŭs* [Gr. *strabismos*, a squinting; *strabos*, squinting—from *strephō*, I turn]: in *med.*, squinting; a defect of vision in which both eyes cannot be directed to the same object: see SQUINTING.

STRABO, *strā'bō:* famous ancient geographer and historian: b. prob. between B.C. 64 and 62, in Amasea in Pontus; date of death unknown, but after A.D. 20. By the mother's side he was of Greek descent, and connected with the Mithradatidœ (SEE MITHRADATES): of his father or his father's family nothing is known. How the name Strabo ('squint-eyed') must have originated is obvious, but whether any of the family were so called before him is uncertain. Strabo was well educated under the grammarians Tyrannio of Amisus in Pontus, and Aristodemus of Nysa in Caria, and the philosopher Xenarchus of Seleucia in Cilicia. He does not appear to have followed any professional calling, but to have spent his life in travel and study, from which it is inferred that he had wealth, or at least considerable means. He was at Corinth B.C. 29; in Egypt B.C. 24, and ascended the Nile; at Rome after A.D. 14, and was still writing A.D. 21. It is conjectured that he died at Rome. Strabo's *Geography* is a work of great value in those parts especially which record the results of his own extensive observation. 'Westward,' he says in a passage in the 2d book, 'I have travelled from Armenia to the parts of Tyrrhenia adjacent to Sardinia; toward the south, from the Euxine to the borders of Ethiopia. And perhaps there is not one among those who have written geographies who has visited more places than I have between these limits.' Yet it must not be supposed that he describes with equal accuracy or fulness all the countries of whose geography he treats. Some he seems to have visited hurriedly, or in passing elsewhither; others he knows like a native. Thus, his accounts of Greece, particularly the Peloponnesus, are very meagre, and of many of the obscurer regions he writes chiefly from hearsay. He makes copious use of his predecessors, Eratosthenes, Artemidorus, Polybius, Posidonius, Aristotle, Theopompus, Thucydides, Aristobulus, and many other writers now lost to us; but he strangely depreciates the authority of Herodotus, and quotes few Roman writers except Fabius Pictor and Julius Cæsar. His *Historical Memoirs* and *Continuation of Polybius* are lost. His *Geography* is in that department the first known work, and the most important left us from antiquity. Its historical notices, though incidental, are valuable and interesting. He accepts the Homeric geographical scheme. The work comprises 17 books, of which the first two are introductory, the next eight are devoted to Europe, the six following to Asia, and the last to Africa. The style is pure and simple. The *editio princeps* of Strabo appeared at Venice 1516; a notable recent one is that by Müller and Dübner (2 vols. 1853-57).

STRABOMETER, n. *stra-bŏm'ĕ-tėr* [Gr. *strabos,* squinting; *metron,* measure]: in *surg.* an instrument for measuring the want of concordance of the optic axes. STRAROBOME, n. *strā'botōm,* knife for operating for strabismus. STRABOTOMY, n. *stra-bŏt'o-mĭ* [Gr. *strabos,* squinting; *tomē,* a cutting]: operation for the cure of squinting by cutting the muscle or muscles that distort the eyeball.

STRACHEY, *strā'chĭ,* JOHN SAINT LOE: English journalist: b. 1860. He was educated at Oxford, and has been a London journalist from 1884. He was editor of the *Cornhill Magazine* 1896-7, and is now editor and owner of *The Spectator* and proprietor of *The Country Gentleman.* He has published *From Grave to Gay.*

STRACHEY, WILLIAM: English colonist and historian: b. England about 1585. Nothing definite is known of him before the sailing of a party of colonists 1609, May 15, bound for Virginia. He sailed in the Sea Venture, which was wrecked on the Bermudas in July. An account of the wreck was written by Strachey and published in *Purchas his Pilgrimes* (1625) under the title *A True Repertory of the Wracke and Redemption of Sir Thomas Gates upon and from the Islands of the Bermudas, his coming to Virginia and the state of that Colony.* Strachey and his party finally reached Jamestown, 1610, May 23, where he was appointed secretary and recorder of the colony by Lord De la Warr. He returned to England in 1611 and he edited the laws promulgated for Virginia by Sir Thomas Gates and Sir Thomas Dale, *For the Colony in Virginia Britannia Lawes Divine, Morall and Martiall, Alget qui non ardet* (1612). His larger work on Virginia, *The Historie of Travaile into Virginia Britannia, expressing the Cosmographie and Comodities of the Country, Together with the Manners and Customes of the People. Gathered and Observed As Well by those who went First Thither, As Collected by William Strachey, gent. Three Yeares thither Imployed Secretarie of State,* failed of finding a publisher during his lifetime and was brought out by the Hakluyt Society in 1849. This is regarded as the most ably written of the numerous accounts of the settlement of Virginia.

STRADDLE, v. *străd'dl* [Dut. *strijden;* Ger. *Streiten;* Icel. *strida,* to contend, to oppose: Dan. *stride,* to set the feet apart for the purpose of resistance]: to place one's self astride; to stand or walk with the legs far apart; to walk wide and awkwardly; N. the act of standing, sitting, or walking with feet unusually far apart; the distance between the feet of one who straddles. STRAD'DLING, imp. *-dlĭng:* ADJ. standing or walking with the legs unusually far apart. STRADDLED, pp. *străd'dld.*

STRADEL'LA, ALESSANDRO: Italian musical composer and singer, in the last half of the 17th c.; famous for his influence on the music of his country, and his

tragical history. His birth at Naples 1645, long the accepted account, cannot be verified. His works, which consist of numerous airs, duets, cantatas, madrigals, 6 oratorios, and 11 operas, show extraordinary genius, and contributed largely to form the taste of succeeding composers, particularly Purcell, Clari, Steffani, and Alessandro Scarlatti. S. was renowned for his exquisite voice and polished manner; and when engaged in Venice, instructing Ortensia, a young lady of rank, mistress of a Venetian noble, the musician and his pupil became mutually enamored, and fled to Rome. They were traced thither by two bravos whom the Venetian employed to kill S., and who were prepared to assassinate him in the church of San Giovanni Laterano, where S was conducting an oratorio which he had just composed; and both assassins, it is said, were so captivated with his voice that they abandoned their object and betrayed to him the plot. Pursued by other bravos, headed by Ortensia's father, to Turin, S. was stabbed, but not mortally, when lodged in the palace of the Duchess of Savoy. Thereupon S. married Ortensia; and went to Genoa, where, about a year later (1678, or perhaps soon after 1681) he and his wife were mortally stabbed in their bedchamber by the emissaries of their unrelenting persecutor. See Bonnet-Bourdelot's *Histoire de la Musique et de ses Effets* (Paris 1715).—At the Biblioteca Palatina in Modena are 148 musical MSS. of S.: others are in the Brit. Museum, and in the library of Christ-Church, Oxford. The beautiful *Pietá Signore,* frequently printed and ascribed to S., cannot be verified as his composition.

STRADIVARIUS, *strâ-dē-vâ'rē-ûs* (or STRADIVARI *strâ-dē-vâ'rē*), ANTONIO: famed violin-maker of Cremona 1649–1737. S. was pupil of Amati: his best violins, made 1700–25, settled the Cremona pattern: see VIOLIN.

STRAFFORD, *stră'f'ĕrd,* THOMAS WENTWORTH, Earl of: 1593, Apr. 13—1641, May 12; b. London; eldest son of Sir W. Wentworth of Wentworth, Woodhouse, Yorkshire. He was educated at St. John's, Cambridge. In 1611 he was knighted, and married Lady Margaret Clifford, eldest daughter of the Earl of Cumberland. After her death 1622 he was twice married. Subsequently he was chosen member of parliament for the county of York. Soon after his re-election to parliament for Yorkshire 1621, he took up his residence in London. Slighted by the Duke of Buckingham, who then ruled the court and cabinet of Charles I., Wentworth signalized himself as an opposer of the administration. In 1626 he was made sheriff of his county, with the view of preventing him from attending parliament. So resolutely did he oppose the arbitrary royal loan exacted in the following year, that the government deemed it advisable to put him in prison. But Buckingham was little aware of the energy of his opponent. S., having obtained his release, came to the following parliament, resolved to make his power felt both by king and minister. He spoke eloquently on the question of grievances, and was conspicuous in obtaining

the royal assent to the Petition of Right. He was obviously a man worth gaining; and his patriotism, if it had any genuine element, was, unhappily, not strong enough to withstand the temptation now held out to his personal ambition. With his elevation to the peerage, as Baron Wentworth, 1628, he seems not only to have lost all solicitude for popular liberty, but openly to have become its most determined enemy. As pres. of the 'Council of the North,' he appears to have abused his powers, not only for political purposes, but often only to gratify his pride. The legality of the jurisdiction exercised by the council, created by Henry VIII., was very doubtful; and interdicts against it were at various times applied for from the courts at Westminster. S. declared openly that he would 'lay by the heels' any judge presuming to interdict the council from exercise of such powers as he chose to hold that it possessed. Nevertheless, this was done by Judge Vernon. In 1631 S. was made deputy of Ireland, and 1639 Earl of Strafford and lord lieut. of Ireland. According to his views, that country belonged to the crown by right of conquest; and neither the natives, nor the descendants of the conquerors themselves, had any rights which could interfere with its sovereignty. Not showing unkindness to the Irish personally, S.'s theory of government for Ireland was to make the nation English Protestants by high-handed force. His rule was of despotic violence, but the administration of justice, in ordinary cases, was prompt and vigorous. Outrage was suppressed, and commerce flourished under his strong hand; and he did much to purify the corrupt English official administration in Ireland. Understanding fully the feelings, policy, and resources of the party to which he had originally belonged, S. had matured a vast political scheme, to which, in his confidential correspondence, he gave the expressive name 'Thorough.' His object was to do in England what Richelieu was doing in France—to make Charles as absolute as any continental monarch; to put the estates and personal liberty of the whole people at the disposal of the crown; to deprive the courts of law of all independent authority; and to punish with merciless severity all who murmured against the government, or who applied to any tribunal for relief from its despotism. He urged the king to invade Scotland, with the advice to meet any resistance in England to this step by bringing over the army from Ireland. This advice proved fatal to S. Happily, the people of England were too strong for him. On his entering the house of peers, on the meeting of the Long Parliament 1640, the message from the house of commons was called in, and Pym, in the name of the commons of England, impeached 'Thomas, Earl of Strafford,' of high treason. This course was afterward abandoned, and the commons proceeded by bill of attainder, which passed the house 1641, Apr. 21, and immediately afterward passed in the house of lords; and received the royal assent under fear of a popular tumult. S. certainly merited his fate, but nothing can excuse the cowardice of

the king. The earl was beheaded on Tower Hill. The attainder was reversed in the reign of Charles II., and his son succeeded to the honors.—See Hallam's *Constitutional History;* Macaulay's *History of England.*

STRAGGLE, v. *străg'gl* [a derivative of STRAY, which see]. to move irregularly in varying directions; to separate from the regular line of march; to rove; to shoot or extend too far, as the branches of a tree. STRAG'GLING, imp. *-glĭng:* ADJ. wandering; roving; ranging loose; outlying; standing apart. STRAGGLED, pp. *străg'gld.* STRAG'GLER n. *-glĕr,* one who wanders from the regular line of march, or from his companions; a wanderer.

STRAIGHT, a. *strāt* [Ger. *strecken,* to stretch: Dan. *strækk,* a stretch (see STRETCH)]: being in a right line; direct; not crooked; upright: AD. immediately; directly; in a direct line. STRAIGHT'LY, ad. *-lĭ,* not crookedly; tightly; closely. STRAIGHT'NESS, n. *-nĕs,* the quality or state of being straight; rectitude. STRAIGHTEN, v. *strāt'n,* to make straight. STRAIGHT'ENING, imp. *-nĭng.* STRAIGHTENED, pp. *strāt'nd.* STRAIGHTENER, n. *strāt'nĕr,* that which straightens. STRAIGHTFOR'WARD, a. proceeding in a straight course; not deviating. STRAIGHTFOR'WARDNESS, n. direction in a straight course; undeviating rectitude. STRAIGHT'-WAY, ad. *-wā,* or -WAYS, *-wāz,* in a straight or direct manner; immediately; without delay. STRAIGHT-EDGE, a strip of wood or metal with at least one side perfectly straight, for ascertaining whether a surface is even. STRAIGHT-LINED, a. having or consisting of straight lines. TO GO STRAIGHT, to act honestly.

STRAIKS, n. plu. *strāks* [from Eng. *streak:* Dan. *streg,* a stripe, a line]: plates of iron placed over the joints of the felly of a cannon-wheel.

STRAIN, v. *strān* [OF. *estraindre,* to strain—from L. *stringĕrĕ,* to squeeze, to wring]: to extend with great effort; to injure or weaken by stretching or overtasking; to put to the utmost strength, to make straight or tense; to make violent efforts; to make uneasy or unnatural; to constrain; to sprain; to force; to press or squeeze, as in an embrace: to purify by passing through a filter or some porous substance; to filter: N. a violent effort; an injury by excessive exertion; the force exerted on a substance tending to cause it to rupture or break (see STRENGTH OF MATERIALS): continued manner of speaking or writing; a song; part of a tune; one of the periods into which a musical composition is divided by double bars—the strain being further subdivided into periods, sections, phrases, and feet: manner of speech or action; tendency. STRAIN'ING, imp.: ADJ. making great efforts; filtering: N. the act of putting to the utmost stretch; the act of filtering. STRAINED, pp. *strānd:* ADJ. stretched; filtered. STRAIN'ER, n. *-ĕr,* a filter for liquids. STRAINING-PIECE, in *building,* a piece of timber to keep apart other two pieces. A STRAINING FOR EFFECT, a forced attempt to produce a sensation. TO STRAIN AT A GNAT AND SWALLOW A CAMEL, to make a great ado about small sins while condoning great ones.

STRAIN, n. *strān* [AS. *strynan*, to acquire, to procreate, *strynd*, stock: prov. Eng. *strene*, shoot of a tree, progeny]: race; blood; breeding; character; tendency; hereditary disposition; in *Scot.*, resemblance of the features, as, he has a *strain* of his grandfather—that is, he resembles him.

STRAIT, a. *strāt* [OF. *estreit*, narrow—from L. *stricius*, drawn tight; *stringĕrĕ*, to draw tight]: narrow; confined; not broad; close; difficult; rigorous; avaricious: N. a narrow passage of water between two seas or oceans; distress; difficulty—often in the plu.: V. in *OE.*, to put to difficulties. STRAIT'LY, ad. *-lĭ*, narrowly; closely; strictly. STRAIT'NESS, n. *-nĕs*, the state or quality of being strait; narrowness; want; scarcity. STRAIT-LACED, a. stiff; constrained; scrupulous. STRAIT-JACKET, or STRAIT-WAISTCOAT, a contrivance for confining the arms of a lunatic or violent person. STRAITEN, v. *strāt'n*, to contract: to confine; to make tight; to deprive of necessary room; to press with poverty or other necessity; to press or perplex. STRAIT'ENING, imp. *-nĭng*. STRAITENED, pp. *strāt'nd*.

STRAITS SETTLEMENTS: collective British settlements in the Straits of Malacca, comprising Singapore (q.v.), Malacca (q.v.), and the Prince of Wales Island (q.v.), or Penang, including the province of Wellesley: 1,350 sq. m.: see MALAY ARCHIPELAGO: MALAY PENINSULA: ETC. The S. S. were transferred from the control of the Indian govt. to the Brit. colonial sec. 1867. The seat of govt. is at Singapore. Pop. (1881) 390,000; (1901) 572,249.

STRAKE, n. *strāk* [a form of STREAK, which see]: a narrow board or plank; the tire or iron band of a wheel; in *ship-building*, the term for a line of planking extending from the stem to the stern.

STRAKOSCH, *străk'ŏsh*, MAURICE: impressario and pianist: 1825, Jan. 15—1887, Oct. 9; b. Butshowitz, Moravia. Having already achieved reputation in Europe as pianist, he visited the United States 1848. Soon afterward he organized an opera troupe, and thenceforward applied himself to operatic management. He wrote many compositions for the piano which attained much popularity. Shortly before his death he wrote (in French) a small volume of *Souvenirs*.—His bro., MAX S., b. Brunn, Moravia, 1835, Sep. 27, impressario, was associated with Maurice. Among the famous artists introduced by the brothers S. to the Amer. public were Gottschalk, Parepa-Rosa, Marie Roze, Carlotta and Adelina Patti (their sister Amalia, was wife of Maurice S.), Carl Formes, Brignoli, Campanini, Lucca, Tietjens, Nilsson, and Marietta Alboni.

STRALSUND, *strâl'sûnt:* fortified town and seaport of Prussia, province of Pommern, on the narrow strait Strela Sunde between the mainland and the island of Rügen. S. forms an island surrounded partly by the sea, partly by large pools of salt water, and connected with the mainland by three bridges. The natural strength of the place is greatly increased by formidable fortifications. Right in front of the harbor lies the fortified island of Dänholm. S. has narrow but regular streets; and many of the houses

are finely gabled, giving the town a quaint and ancient look. There are three great Gothic churches dating from the 14th and 15th c.; and the town-house, whose oldest part dates from 1316.—The public library, founded 1769, contains 60,000 vols. S. has large export-trade, especially in malt and corn, and has manufactures of leather, sugar, starch, mirrors, and cards. There entered the port (1884) 542 ocean ships, and 1,964 river-craft; cleared, 513 ships, 1,964 river-craft.—S. was founded 1209 by Prince Jaromar of Rügen, became a member of the Hansa, and rapidly rose into importance. During the Thirty Years' War, it was unsuccessfully besieged (1628) by Wallenstein; and after being, with alternations of fortune, in possession of Sweden about 200 years, it finally passed to Prussia 1815; but still retains much of its ancient municipal independence. Pop. (1901) 31,083.

STRAMASH, n. *strä-mäsh'* [F. *estramaçon*, a quarter-staff, a blow, a two-edged sword—from It. *stramazzo*, a stretching blow, a violent fall—from *mazza*, a club]: in *Scot.* and *prov. Eng.*, a disturbance; a broil: V. to strike; to beat; to destroy.

STRAMINEOUS, a. *strä-mĭn'ē-ŭs* [L. *straminĕus*, made of straw—from *stramen*, straw]: in *bot.*, straw-colored; strawy.

STRAMO'NIUM: see THORN-APPLE.

STRAMONY, n. *străm'ō-nĭ*, or STRAMONIUM, n. *strä-mō'nĭ-ŭm* [origin unknown]: the thorn-apple, whose leaves and seeds are used medicinally; the *Datūra stramōnĭum*, ord. *Solanācĕæ*.

STRAND, n. *strănd* [Icel. *strönd*; Dan., Ger., and Sw., *strand*, border, margin]: the shore or beach of a sea, an ocean, or of a large lake: V. to drive or force on a shore or on shallows; to run aground, as a ship; hence, to come to a stand. STRAND'ING, imp. STRAND'ED, pp.

STRAND, n. *strănd* [Dut. *streen;* Ger. *strähn*, a hank, as of thread]: one of the strings of which a rope is composed.

STRANGE, a. *strānj* [OF. *estrange*, strange—from L. *extrānĕus*, foreign—from *extra*, on the outside: It. *stranio*]: foreign; not before known; new; wonderful; unusual; rarely met with; eccentric; singular; in *OE.*. remote. STRANGE'LY, ad. *-lĭ*, in a strange manner; in a way to cause wonder with a degree of dislike; in *OE.*, with some relation to foreigners. STRANGE'NESS, n. *-nĕs*, the condition of being strange; reserve; coldness; distance of behavior; the power of exciting surprise; in *OE.*, uncouthness; remoteness from common manners or notions; mutual dislike: V. in *OE.*, to estrange. STRANGER, n. *strān'jĕr*, a foreigner; one who is unknown; a visitor; one not admitted to friendship or fellowship; one not a domestic. STRANGE-LOOKING, a. having an odd or unusual look.—SYN. of 'strange': eccentric; singular; odd; irregular; outlandish; astonishing; marvellous; uncommon; queer; particular.

STRANGE, Sir JOHN: English legal writer and reporter: 1696–1754; b. London. He became solicitor-gen. 1736, recorder of London 1739, Master of the Rolls 1754. His chancery and exchequer *Reports* appeared after his death, edited by his son (2d. ed. 2 vols., 1782); als a vol. *Select Cases on Evidence.* S. has been highly praised by some jurists, and doubted by others.

STRANGE, JOHN, LL.D.: British diplomatist and antiquary: 1732–1799; son of Sir John S. Being appointed Brit. resident at Venice he availed himself of the opportunity for antiquarian study, and made extensive collections in that department—a museum, a gallery of pictures, and an admirable library. He contributed many papers to *Archæol. and Phil. Transactions.* After his death his collected treasures were sold, and the bibliographer is still interested in the catalogue of them, *Bibliotheca Strangiana, etc.: Digested by Samuel Paterson* (London, 800, 1801).

STRANGE, *strānj*, Sir ROBERT: eminent engraver: 1721, July 14—1792, July 5; b. in the Mainland of Orkney; of old Scotch family. After a little abortive study of law at Edinburgh, he was apprenticed to an engraver there named Cooper. In 1745 he deserted art for arms, joining the Jacobite army of Charles Edward, not so much from enthusiasm in his cause, as to find favor with Isabella Lumisden, granddaughter of a bp. of Edinburgh. After the final collapse of the adventure, he was in hiding in the house where Miss Lumisden resided, and when it was searched by the soldiery, was somewhat ingloriously concealed by that young woman, who soon afterward married him. He went abroad with his wife, and at Paris was under the tutelage of Le Bass and of Descamps. In 1751 he settled in London, and speedily attained the very highest rank in his profession, especially by his plates of the Magdalen and of Cleopatra, after Guido 1753. On again going abroad in 1760 to execute plates of the most famous pictures of the old masters, his eminence was recognized by the academies of Paris, Rome, Florence, Bologna, and Parma, all of which conferred on him the honor of membership; and the distinction of knighthood 1787 testified to his favor in his own country. S. died in London, leaving a large fortune. To this day, S. is ranked at the very head of British engravers, and his reproductions of the nobler specimens of the old masters are much prized by the connoisseur.—See the account, with intelligent criticism, in the amusing work, *Memoirslof Sir Robert Strange, Knight, Engraver, etc.* (2 vols. 1855), by James Dennistoun of Dennistoun.

STRANGFORD (PERCY-CLINTON-SYDNEY SMYTHE), Viscount: British diplomatist: 1780, Aug. 31—1855, May 29. His mother was eldest dau. of Frederick Phillipse (q. v.) of N. Y. He graduated at Trinity Coll., Dublin, 1800. He succeeded to his title 1801; and after serving as sec. of legation at Lisbon, was ambassador successively to Portugal, Sweden, Turkey, and Russia. In 1825 he was raised to the Brit. peerage as Baron Penshurst. He pub. 1803 a transl. of Camoens's *Rmais.*

STRANGFORD (PERCY-ELLEN-FREDERICK-WILLIAM SMYTHE), Viscount: philologist: 1825, Nov. 26—1869, Jan. 9; b. St. Petersburg, where his father was Brit. ambassador. He was educated at Harrow and at Oxford. His linguistic studies took an almost unexampled range, though his writings pub. during his life comprised only articles in periodicals. His *Selected Writings* (2 vols.), ed. by his widow, appeared 1869; *Letters and Papers*, 1878.

STRANGLE, v. *străng'gl* [OF. *estrangler*, to strangle —from L. *strangŭlō;* Gr. *strang'galaō*, I throttle]: to suffocate; to choke; to stifle; to destroy life by so compressing the throat as to stop respiration; to suppress at first appearance: STRAN'GLING, imp. *-glĭng:* N. death by compressing the throat. STRANGLED, pp. *străng'gld:* ADJ. killed by strangulation. STRAN'GLER n. *-glėr*, one who strangles. STRAN'GULATED, a. *-gū-lā-tĕd*, in *surg.*, having the circulation stopped in any part by compression; in *bot.*, contracted and expanded irregularly. STRAN'GULA'TION, n. *-lā'shŭn* [F.—L.] act of destroying life by stopping respiration; the state of being strangled (see below): that kind of suffocation common to women in hysterics.

STRANGLES, *străng'glz:* catarrhal disease, similar to and often called distemper (see DISTEMPER, *in Horses*), which affects the horse, mule, and ass. Among the causes are exposure, improper feeding, and impure air. The affected animal should be isolated and receive the best of care. In severe cases an abscess will form between the bones of the lower jaw. This should be poulticed, and when brought to a head should be opened. Strangles is a debilitating disease, and considerable time is required for recovery. During convalescence a liberal quantity of nourishing food should be supplied, and the degree of exercise or labor must be proportioned to the strength of the animal.

STRANGULA'TION: 'an act of violence in which constriction is applied directly to the neck, either around it, or in the forepart, so as to prevent the passage of air, and thereby suddenly suspending respiration and life'—a definition by Dr. Taylor, which, as he observes, obviously includes Hanging. The medico-legal relations of hanging and of the other varieties of strangulation are here to be considered. To the primary cause of death from hanging (see HANGING) it is necessary to add that if a person who has been hung has been cut down sufficiently soon to allow of the respiratory process being restored, he is not thereby safe—death often taking place from secondary effects at various periods. The most prominent morbid appearance in these instances has been extreme congestion of the brain.

When the suspension of the body has not continued much more than five minutes, and the parts about the

neck have not suffered violence, there is probability that resuscitation may be established; though many cases are recorded when, after only a few minutes' suspension, this has been found impossible. It is believed that death takes place very rapidly and without suffering; the violent convulsions so often observed being similar to those in epilepsy. A man named Hornshaw, who was on three occasions resuscitated from hanging—a feat which he performed in London for amusement of the public—stated that he lost his senses almost at once; and other persons who have been restored report that the only symptoms of which they were conscious were a ringing in the ears, a flash of light before the eyes, then darkness and oblivion. The treatment after the patient has been cut down is briefly as follows: exposure to a free current of air, cold affusion if the skin is warm; application of ammonia to the nostrils, of mustard poultices to the chest and legs, and of hot water to the feet; and subsequent abstraction of blood if there be much cerebral congestion: artificial respiration also should be tried if the above means fail to re-establish the respiratory process. In case of strangulation from other causes than that of hanging, the post-mortem symptoms are similar, but the injury to the parts about the neck is usually greater. In manual strangulation the external marks of injury will be in front of the neck, about and below the larynx; and if death has been caused by a ligature, the mark round the neck will be circular, whereas in hanging it is usually oblique. The internal appearances are much the same as in hanging.

STRANGURY, n. *străng'gū-rĭ* [Gr. *stranggou'rĭa*, difficulty in passing urine—from *strangx*, a drop; *ouron*, urine]: in *surg.*, difficult and painful urination. STRANGURIOUS, a. *străng-gū'rĭ-ŭs*, affected with or resembling strangury.—*Strangury* is perhaps to be regarded as a symptom rather than a disease. It shows itself in a frequent and irresistible desire to pass water, which is discharged, however, in very small quantity, and with scalding and cutting pains along the urethra. The pain often extends to the bladder and even to the kidneys; and is sometimes so severe as to implicate the lower bowel (the rectum), and to produce the straining condition known as *Tenesmus*. It is caused usually by irritating substances in the urine, especially by *cantharides* or Spanish flies (whose irritant principle is liable to find its way into the renal secretion, whether the drug is taken internally or merely applied to the skin as a blistering agent), and by oil of turpentine administered internally in small doses; and is generally present in cases of gravel. Severe as the affection is, it is very transitory, and yields readily to treatment. After removal of the cause if it can be recognized and if its removal is possible, mild mucilaginous draughts (e.g., of barley-water)

should be freely given to render the urine less irritating. The warm bath also is useful, and, if it cannot readily be obtained, hot local fomentations often relieve the pain and cause the urine to pass more freely.

STRAP, n. *străp* [Dut. *strop*, a noose: Sw. *stropp*, a tie; a trap: L. *struppus*, a thong: Gr. *strophos*, a twisted band—from *strephō*, I twist]: long narrow piece of leather; a thong: iron plate for connecting two or more timbers, to which it is bolted or screwed: V. to fasten or bind with a strap; to punish with a strap. STRAP'-PING, imp. STRAPPED, pp. *-străpt*. STRAP-SHAPED, a. in *bot.*, in length about six times its own breadth. STRAP'-PER, n. *-pėr*, one who uses a strap. See also under STRAPPING.

STRAP-WORK: a style of architectural ornamentation or enrichment general in the 15th and 16th centuries, but of which specimens exist executed as far back as the 11th century, consisting of a narrow fillet or band folded and crossed, and occasionally interlaced with another.

STRAPPA'DO: a former military punishment, which consisted in having the hands of the offender tied behind his back, drawing him up by them to a certain elevation by a rope, and then suddenly letting him drop to within a certain distance of the ground.

STRAPPING, a. *străp'pĭng* [Bret. *strapa*, to make a noise: It. *strappare*, to tear away with violence]: bouncing; bulky; tall and stout; lusty; handsome. STRAP'PER, n. *-pėr*, *familiarly*, a well-grown and still-growing stout healthy young person of either sex.

STRASBURG, *străs'bėrg* (Ger. *Strassburg*, *strâs'-bûrch*; Fr. *Strasbourg*): fortified town, former capital of the French department of the Bas-Rhin, but, since 1871, capital of the new German province of Alsace-Lorraine (Elsass-Lothringen); at the confluence of the Ill and the Brusche; about 2 m. from the left bank of the Rhine, 89 m. n. of Basel, 312 m. e. of Paris by rail. The citadel, built by Vauban 1684, was demolished by the Germans during the bombardment of 1870; but 1873 they began to rebuild it, and this, with a system of 14 detached forts three to five m. from the central town, makes the position a fortress of the first rank. The most celebrated building is the minster, or cathedral, founded 1015, whose nave is one of the most sublime specimens of Gothic architecture. Of the two w. towers, one, that the s. corner, has not been completed. The other, finished 1399, rises, according to Baedeker, 495 ft. above the pavement—14 ft. higher than the original top of the Pyramid of Cheops, and 17 ft. less in height than the towers of Cologne Cathedral. The minster has a remarkable astronomical clock (1838-42) representing the planetary system. Other notable structures are the Protestant Church of St. Thomas, with the tomb of Mar-

shal Saxe and various monuments to distinguished Strasburg scholars; the *Temple Neuf*, or New Temple, the synagogue of the Jews, the town-house, the Palace of Justice, the arsenal, the episcopal palace, and the theatre. The University of Strasburg was the only complete university in France—i.e., the only one with full complement of faculties—besides the University of Paris. It was founded 1621, became specially famous in medicine and philology, went to the ground during the great Revolution, and had its place supplied by an *Ecole Centrale*. In 1803 a Protestant academy was established, with 10 chairs, for teaching theology, philology, philosophy, and history. Five years later Napoleon founded an imperial academy, with faculties of law, medicine, physical science, and philosophy; and 1819 a partial fusion of these academies took place, to the benefit of both. The university was reopened 1872, after the Franco-German war, as the Kaiser Wilhelm Univ.: in 1882 it had 104 professors and 825 students (216 from Alsace-Lorraine): a handsome building was erected for it 1884. The famous library of Strasburg, of nearly 200,000 vols., rich in *Incunabula*, was entirely destroyed by fire during the bombardment of 1870; but has been replaced by a new collection contributed from all parts of Germany, that has now increased to about 600,000 vols.; though the precious incunabula and MSS. cannot be replaced.

The trade of Strasburg, especially its transit-trade, is very extensive, and it has great variety of manufactures —guns, rifles, beer, patés de foie gras (see GOOSE), watches, clocks, leather, cottons, woolens, silks, cutlery, musical and mathematical instruments, jewelry, brandy, potash, tobacco, etc. The annual value of the Strasburg pies (above noted) sent out is more than $500,000. The Basel and Baden railways, the railway to Paris, and the communication with Rotterdam and London by the Rhine steamers, as well as with the Danube and all the great rivers of France by canals, gives large facilities for commerce. The country about Strasburg is fertile and carefully cultivated, with beautiful gardens, mansions, and villages.

Strasburg, the *Argentoratum* of the Romans, was extant before the time of Cæsar, but is mentioned first by Ptolemy. The Romans had a manufactory of arms here. In the 5th century it appears to have received the name *Strata-Burgum* or *Strata-Burgus*, perhaps from the invading Franks, whence the modern name. The city, after long struggle, threw off by force the ecclesiastical rule of the bishops 1262; and Strasburg became a free town of the German empire. The Reformation found early advocacy here. After more than seven centuries as a German city, it passed 1681 with the rest of Alsace into the hands of the French, under whom its population and prosperity greatly increased. 1870, Sep. 28, after a bombardment of seven weeks, Strasburg with its garri-

son of 17,000 men surrendered to the Germans, and 1871 was annexed to Germany. Pop. (1900) 151,041.

STRASS, n. *străs* [from the name of its German inventor]: colorless glass, called also Paste, used as the base of artificial gems. See GEMS, IMITATION OF.

STRASS, n. *străs* [etym. doubt.]: the refuse of silk in the process of working into skeins.

STRATA, the plu. of STRATUM, which see.

STRATAGEM, n. *străt'ă-jĕm* [F. *stratagème*, stratagem—from L. and Gr. *stratēgēmă*, a piece of generalship—from Gr. *stratos*, an army; *agō*, I lead]: plan or scheme for deceiving an enemy, especially in war; a trick for gaining some advantage; deceit; imposition. STRAT'EGET'ICS, n. plu. *-ĕ-jĕt'ĭks*, science of military movements; generalship. STRATEGIC, *strā-tĕj'ĭk*, or STRATEG'ICAL, a. *-ĭ-kăl*, pert. to or done by stratagem, or according to the military science of strategy. STRATEG'ICALLY, ad. *-lĭ*. STRATEGIST, n. *străt'ĕ-jĭst*, one skilled in strategy. STRAT'EGY, n. *-jĭ*, science of maneuvering an army out of fire of an enemy, as *tactics* is the art of managing it in battle, or under fire. Strategy is the greater science, as including all those vast combinations which lead to subsequent available displays of tactics. A good strategist has to attend to the establishing of his basis and depots, though some brilliant generals have dared to act without these aids—notably, Sherman in his march to the sea 1864, and Wellington advancing from Portugal through Spain into France 1813. The strategist must know how to diffuse the influence of his arms over a broad area, while holding his force well in hand to strike crushing blows. Strategy, though applied in general to the conduct of complicated military movements, and having some relationship to stratagem, must not be confounded with the latter term. Stratagem is merely any device for deceiving the enemy as to the point or strength of an attack; e.g., ambuscades, feints, bugle-calls to imaginary troops, concealment of infantry by clouds of cavalry, etc. See WAR. STRATEGIC POINT, every point on the theatre of war which conduces to strengthen the line of operation or of communication.

STRATFORD, *străt'fĕrd:* town, port of entry, and capital of Perth co., Ont., Canada; on Avon river and the Grand Trunk railway; 88 m. w. of Toronto. It is in a grain, lumber, cheese, live-stock, and agricultural region; has excellent water-power; and manufactures flour, iron castings, machinery, steam-engines, agricultural implements, woolen goods, leather, and boots and shoes. The town shows much activity and enterprise. Stratford contains the county buildings, town-hall, very handsome railroad station, numerous churches, several banks, and daily and weekly newspapers. Pop. (1901) 9,959.

STRAT'FORD: thriving town of Essex, England; on the Lea; 3 m. e. of London. It is the seat of various and extensive manufactures—flour-mills, distilleries, chemical works, etc. In the town and its suburb, many London merchants have their residences. Pop. (1901) 44,825.

On the opposite side of the Lea is the parish of Stratford-le-Bow, or Bow. Pop. 40,378.

STRAT'FORD, usually STRATFORD-ON-AVON, *-ā'von:* municipal borough and township of England, county of Warwick; 8 m. s.w. of the town of Warwick, 26 m. s. of Birmingham; on the right bank of the Avon, which is here crossed by a stone bridge of 14 arches. Stratford is neatly built, and has quite a modern look, most of the old houses having disappeared; so that the borough has very little resemblance to what it was as Shakespeare saw it. The house in which he was born still stands, though externally much changed. The parish church is a cruciform building in Gothic style, with central tower and lofty spire: it was much improved in the 14th century, and in the 15th century its beautiful choir was built, and about the end of that century the north and south transepts were added. The great poet is buried in the chancel, where his mural effigy is an object of interest. The site of the house which he built in New Place has been bought by public subscription, and on it a theatre with library and picture gallery was built 1877 in his honor.—The town has little trade. Pop. of borough (1901) 8,310.

STRAT'FORD-DE-REDCLIFFE, *-dĕh-rĕd'klĭf* (STRATFORD CANNING), Viscount: English diplomatist: 1786, Nov. 4—1880, Aug. 14; b. London; son of a London merchant, and first cousin of the statesman George Canning. He was educated at Eton, and entered himself of King's College, Cambridge, 1806, but left 1807, on receiving an appointment as précis writer in the foreign office. Later he resumed his studies, and took his degree M.A. He was appointed first secretary of embassy at Constantinople 1808; and was acting minister plenipotentiary 1810-12, entering on his career of bold, shrewd and successful oriental diplomacy. In 1812 Stratford-de-Redcliffe effected the treaty of Bucharest between Turkey and Russia, which established British influence in Turkey for two generations. He was envoy to Switzerland 1814. In 1820 he went as plenipotentiary to the United States, and remained at Washington three years. In 1824 he was sent on special missions to St. Petersburg and Vienna. In 1825 he was appointed by Canning, then foreign secretary, as ambassador extraordinary to the Sublime Porte, where his good offices were warmly exerted on behalf of the Greeks, though these were not successful till after a short war between Turkey and Russia 1829. In 1831 he was accredited with a special mission to Turkey, to fix the boundaries of the new kingdom of Greece, and to settle the treaty in virtue

of which Otho ascended the Greek throne. He previously sat in the house of commons for various boroughs 1828-41. In 1841, having twice refused the governor-generalship of Canada, he was appointed by the government of Sir Robert Peel ambassador at Constantinople, where his influence was strenuously exerted for civilization and for moral and material progress. In 1852 he received his title viscount. When the long-standing quarrel between the Greek and Latin monks in Palestine involved the powers of Europe in the struggle, Stratford-de-Redcliffe remembered how Emperor Nicholas of Russia had, 1829-53, sought to establish an influence, excluding all others, over the Porte, with the view of settling the destinies of Turkey, to the profit of Russia, when the propitious juncture should arrive. When Prince Menchikoff was sent to Constantinople on a mission from the czar, Stratford-de-Redcliffe was prepared to resist the Russian demands. The keen diplomatic struggle from 1853, between Stratford-de-Redcliffe and the Russian ambassador extraordinary is narrated with dramatic power by Kinglake in his *Invasion of the Crimea* —a narrative which may perhaps be criticised as too dramatic for history. This however is certain—that Stratford-de-Redcliffe inspired in the sultan toward England a profound confidence mingled with a wholesome fear; and by his influence with the Porte, succeeded in placing the Russian emperor in the wrong in his hostile act, 1853, July 3, which led to the Crimean war, in which France and England came to the aid of the Porte. Stratford-de-Redcliffe retired from the Turkish embassy and largely from public affairs 1858.—In 1873 he published *Why Am I a Christian?* and in 1876 a play, *Alfred the Great in Athelney.*

STRATH, n. *străth* [Gael, *srath*, a plain beside a river, a broad valley; W. *ystrad*, a flat, a vale]: in *Scot.*, valley of considerable extent through which a river runs. The word is often prefixed in n. Scotland to the names of rivers, as Strathearn, Strathnairn, Strathspey, denoting the open valley through which a river flows. In such cases, however, as Strathmore (great valley), it signifies simply a valley-like depression. In s. Scotland, the Northumbrian word *dale* is used instead, e.g., Clydesdale, Annandale.

STRATHCLYDE, *străth-klīd'*: name for Scottish Cumbria. In the 8th century the ancient confederacy of the Britons was broken up into the separate divisions of Wales and English and Scottish Cumbria. Scottish Cumbria, or Strathclyde, thenceforth formed a little kingdom, comprising the country between the Clyde and Solway, governed by princes of its own, with the fortress-town Alclyde or Dumbarton for its capital. Becoming gradually dependent on Scotland, it was annexed to the Scottish crown at the death of Malcolm I., on failure

of the line of native sovereigns. Edgar bequeathed Strathclyde to his youngest brother David, again separating it from the crown of Scotland, which went to his intermediate brother, Alexander I. David held it throughout Alexander's reign in spite of that king's opposition; and on Alexander's death without issue 1124, Strathclyde was permanently reunited to the Scottish kingdom under David I

STRATHCONA, Canada: a town of Alberta, Northwest Territories; on the high s. bank of the n. Saskatchewan river, opposite Edmonton, with which it is connected by a steel bridge. It is the northern terminus of the Calgary and Edmonton branch of the Canadian Pacific railway, and with Edmonton is the transportation centre for the grain, cattle, and other industries of northern Alberta. There are some manufactures, including flour, oatmeal, butter and cheese, lumber, foundry products, boats, and dredges. Coal is mined in the vicinity. Strathcona has churches, schools, banks, and weekly newspapers. Pop. (1901) 1,550; (1908 est.) 5,000.

STRATHCONA AND MOUNT ROYAL, Donald Alexander Smith, Lord: Canadian statesman: b. Archieston, Morayshire, Scotland, 1820. He went to Canada in the employ of the Hudson Bay Company in 1838; he spent 13 years on the Labrador coast, and was then stationed in the Great Northwest, where he was promoted to be a chief factor; later he was named resident governor and chief commissioner of the company in Canada. He first became prominent in public life when appointed special commissioner by the Dominion government to investigate the insurrection at the Red river settlement. In 1870 he was elected to the Manitoba legislature on the organization of that province, and to the Canadian house of commons, and was also appointed a member of the Northwest Territorial council. In 1874 he resigned from the Manitoba legislature; and in 1880 lost his seat in the Canadian house. He reentered public life in 1887, when he was again elected to the house of commons, remaining there till 1896, when he was appointed to represent the Dominion of Canada in London as high commissioner. At the beginning of his political career he supported Sir John Macdonald, the conservative leader, but at the time of the 'Pacific scandal' in 1873, he transferred his support to the liberals; but after 1878 gave Macdonald independent support in his fiscal and railway policy. He has been actively connected with many industrial and commercial undertakings, but his name is particularly connected with railway development in Canada, especially the organization and success of the Canadian Pacific railway is due largely to him. In 1886 he was knighted and in 1896 raised to the peerage as Baron Strathcona and

Mount Royal. In 1896 he endowed the Royal Victoria College in Montreal, for the higher education of women.

STRATHPEFFER, *străth-pĕf'fĕr:* valley and watering-place in Ross-shire, Scotland, about 4 m. w. of Dingwall by rail.

STRATHSPEY, n. *străth'spā* [from the district in Scot. where first practiced]: Scottish national dance slower than the reel, which is said to derive its name from having been practiced first in the district of Strathspey. The name is given also to the lively tune used in the dance.

STRATIFY, v. *străt'ĭ-fī* [F. *stratifier,* to stratify—from mid. L. *stratificārĕ*—from L. *strātum,* the thing spread, a covering; *facĭō,* I make (see STRATUM)]: to lay or place in beds or layers; to arrange in beds. STRAT'IFYING, imp. STRAT'IFIED, pp. *-fīd:* ADJ. in *geol.,* composed of layers or beds of rock-matter; arranged in beds or layers (see STRATUM). STRAT'IFICA'TION, n. *-kā'-shŭn* [F.—L.]: the act or process of arranging in beds or layers. STRATIFORM, a. *-fawrm* [L. *strātum,* the thing spread; *forma,* a shape]: in layers or beds; applied to rock-masses, whether aqueous or igneous, having more or less a stratified appearance. STRATIGRAPHY, n. *strā-tĭg'-rā-fĭ* [Gr. *graphō,* I write]: the arrangement or classification of any remains according to the stratum of the earth's crust to which they belong. STRATIGRAPHICAL, a. *străt'ĭ-grăf'ĭ-kăl,* of or pertaining to. STRAT'IGRAPH'-ICALLY, ad. *-lĭ.*

STRATIOTES, *străt-ĭ-ō'tēz* [Gr., a soldier]: genus of plants of nat. order *Hydrocharideæ. S. aloides,* popularly WATER SOLDIER, in lakes and ditches in e. England and other parts of Europe, also Siberia, is a singular plant with numerous leaves, which are strap-shaped and spring from the root, from which springs also the two-edged flower-stem, bearing the spathe with beautiful and delicate white flowers. In autumn the whole plant disappears, the root alone remaining at the bottom of the water; from which a number of young plants arise in spring, filling up ditches so that nothing else can grow in them. It is a very ornamental aquatic plant. It is known by a variety of common names, such as crab's-claw, knightswort, water-sengreen, etc.—The name Stratiotes is applied also in zoology to a genus of ground-beetles in South America.

STRATOCRACY, n. *strā-tŏk'rā-sĭ* [Gr. *stratos,* an army; *kratos,* strength]: a military government. STRATON'IC, a. *-tŏn'ĭk,* of or relating to an army. STRATOT'IC, a. *-tŏt'ĭk,* warlike; military. STRATOG'RAPHY, n. *-tŏg'rā-fĭ* [Gr. *graphō,* I write]: a description of what belongs to an army. STRAT'OGRAPH'ICAL, a. *-ō-grăf'ĭ-kăl,* of or pertaining to.

STRATTON, *străt'ton,* CHARLES SHERWOOD: dwarf: 1838, Jan. 4—1883, July 15; b. Bridgeport, Conn. His

first public exhibition as 'Tom Thumb' was in 1842 at P. T. Barnum's museum, New York. From this time until his death, except in short intervals, he gave exhibitions in this country and Europe, appearing at several European courts and in the principal cities. He acquired a large fortune.—His wife, MERCY LAVINIA (BUMP) STRATTON, was born Middleborough, Mass., 1841, Oct. 31. She made her first appearance 1862, under Barnum's management, assuming the name of Warren. She was married to Stratton 1863, Feb. 10. In 1885 she married Count Primo Magri, an Italian dwarf, and has since given exhibitions with him.

STRA'TUM: one of the layers into which most of the rocks that form the crust of the earth are divided. It implies that the layers have been spread out over the surface; and that they were thus formed we may infer from the deposits now taking place in lakes and seas into which rivers laden with muddy sediment empty themselves. Technically in geology a stratum is a mass, whether thick or thin, separable in character from the rock above and below, and usually with mechanical separation; and if itself divisible, the divisions are termed 'layers,' or, if thick, 'beds.' Bed is used also synonymously with stratum.

All the aqueous rocks, which cover so large a proportion of the earth's surface, are stratified. They were formed from the abraded materials of older rocks (aqueous or igneous), which have been washed down and rearranged. The kind of rock produced depended on the material to which the carrying agent had access. Fine mud would produce shales, sand sandstones, and calcareous matter limestones. In a section, these different kinds of rocks are frequently found to interchange within a short space: this is produced either by the water obtaining different materials, or changing its velocity. Thus the fine sediment which has fallen from slowly flowing water may be covered by a layer of sand brought down by a flood, and this again may have spread over it a covering of shells and corals, and such changes may go on alternately for an indefinite period. Each of the different beds composed of the same kind of material is called a stratum. Thus, in the series mentioned, there would be a stratum of clay, one of sand, and then one of calcareous matter. An assemblage of strata having a common age is called a 'formation,' and this term is extended also to rocks which agree in their composition or origin. Thus we speak of stratified and unstratified, aqueous and igneous, freshwater and marine, primary and secondary, metalliferous and non-metalliferous formations. As a formation is composed of many different beds, so a stratum is frequently made up of several 'laminæ' or 'layers.' The laminæ have more or less firm cohesion, but the strata easily separate from each other. Sometimes the cohesion of the laminæ is so great that it is as

easy to split the rock against as with the grain. In such compact rocks the lamination is obscure, or altogether imperceptible in fresh specimens, but whenever they are exposed to the weather, it becomes obvious. The laminæ have been produced by short interruptions in the deposition, similar to what might result from tidal or other intermittent action. The degree of cohesion may be the result of rapid succession in the acts of deposition, but it is due frequently to metamorphic action subsequent to deposition. The planes of stratification lack the complete coalescence characteristic of lamination; when the contiguous layers are closely united, it is the result of the adhesion of two bodies, not of their coalescence into one.

STRATUM, n. *strā'tŭm*, STRATA, n. plu. *strā'tă* [L. *strātum*, the things spread out, a bed, a layer—from *sternĕrĕ*, to lay flat]: in *geo.*, a bed; a layer; a layer of rock which has been deposited as sediment in water (see below). STRA'TUS, n. *-tŭs*, a widely extended continuous sheet of cloud increasing from below upward; a continuous layer of clouds; the cloud of night.

STRAUS, ISIDOR: American merchant and communal worker: b. Rhenish Bavaria 1845, Feb. 6. He settled in Tolbolton, Ga., and was preparing to enter the West Point Academy, when the civil war intervened. In 1888 he associated himself with R. H. Macy & Co., of New York, and in 1893 with Abraham & Straus, of Brooklyn. Always interested in tariff and currency reform, he was elected 1894, Jan. 3, from the 15th District, New York, to fill the unexpired term of A. P. Fitch to Congress. He is president of *The Educational Alliance* and a prominent worker in charitable and educational movements.

STRAUS, NATHAN: American merchant: b. Bavaria 1848, Jan. 31, brother of Isidor Straus (q.v.). He was graduated from a business college in New York. He then joined his father in the firm of L. Straus & Sons, and since 1888 has been a partner in the firm of R. H. Macy & Co., and since 1892 in that of Abraham & Straus, Brooklyn. He has interested himself actively in civic progress, was appointed in 1893 Park Commissioner, and in 1894 was nominated for mayor of New York by the Democrats, an honor which he declined. He is well known for his system of sterilizing milk for the poor.

STRAUS, OSCAR SOLOMON: American merchant and diplomat: brother of Isidor Straus; b. Otterberg, Bavaria, 1850, Dec. 23. A resident of Georgia from 1854 to 1865, he was graduated from Columbia University in 1871 and from its law school in 1873. He engaged in mercantile life for a time with his father's firm, but found leisure for literary and educational work. He was appointed United States minister of Turkey 1887-9 and 1898-1900, and in 1902, on the death of ex-President Harrison, was chosen a member of the Permanent Court of International Arbitration at The Hague. In 1906 he

was appointed secretary of commerce and labor. He is president of the American Jewish Historical Society and has published *The Origin of Republican Form of Government of the United States* (1886); *Roger Williams* (1894); *The Development of Religious Liberty in the United States* (1896).

STRAUSS, DAVID FRIEDRICH: German theologian; b. Ludwigsburg, Würtemberg, 1808, Jan. 27; d. there 1874, Feb. 8. He studied in Tübingen University; became assistant to a country clergyman in 1830; was appointed temporary professor in the seminary at Maulbronn; resigned this position and went to Berlin in 1831 to study under Schleiermacher and Hegel; returned to Tübingen and lectured on logic and philosophy; and published in 1835 his famous *Life of Jesus,* in which he attempted to prove that the gospel narratives had a mythical origin and growth. To his numerous critics he replied in *Streitschriften* and *Zwei friedliche Blätter.* Appointed in 1839 to the chair of dogmatic theology in Zürich, he was prevented from entering upon his duties by a storm of popular indignation, but received a small pension in recompense. His subsequent writings were: *Christliche Glaubenslehre* (1839-41); *Life of Schubert* (1849); *Life of Christian Märklin* (1851); *Life of Ulrich von Hutten* (1858-60); *Leben Jesu für das Deutsche Volk* (*Life of Jesus for the German People;* 1877); *Der Christus des Glaubens und der Jesus der Geschichte* (The Christ of Faith and the Jesus of History; 1865); and *Der alte und der neue Glaube* (The Old and the New Faith; 1872), in which he defines his final attitude to Christianity, that being now entirely hostile. His more important works have been translated into English.

STRAUSS, JOHANN: Austrian composer of dance music: b. Vienna 1804, Mar. 14; d. there 1849, Sep. 25. He was violinist and assistant conductor in Lanner's orchestra; and in 1824 organized an orchestra of his own, with which he made a number of tours, going to England in 1838; in 1845 he was appointed to conduct the court balls at Vienna. His musical compositions, mostly waltzes, number about 250, and raised the standard of dance music to a high artistic level. Among the waltzes are *Lorelei; Taglioni; Kettenbrücken;* and *Donau-Lieder.*

STRAUSS, JOHANN: German composer, son of the preceding: b. Vienna 1825, Oct. 25; d. there 1899, June 3. Though his father strongly opposed his musical aspiration, he became conductor of an orchestra in a popular restaurant, after the death of his father uniting both orchestras. He conducted the summer concerts in Petropaulooski park in St. Petersburg 1855-65, and the court balls 1863-70. *The Beautiful Danube* is the most celebrated of more than 400 waltzes composed by him, of which many others gained great popularity. He also

composed successful operettas, including: *The Carnival in Rome* (1871); *Prince Methuselah* (1877); *A Night in Venice* (1883); and *The Gipsy Baron* (1885).

STRAUSS, RICHARD: German musician and composer: b. Munich 1864, June 11. He studied music at Munich, was made court musical director there in 1886, and became court kapellmeister successively at Weimar (1889), Munich (1895), and Berlin (1898). In addition to songs and chamber-music, he published a symphony (1884); a fantasy for orchestra, *Aus Italien* (1886); the symphonic poems, *Don Juan* (1889); *Tod und Verklarung* (1890); *Macbeth* (1891); *Till Eulenspiegel* (1894); *Also Sprach Zarathustra* (1896); *Don Quixote* (1898), and *Ein Heldenleben* (1899); and the operas *Guntram* (1894); *Feuersnot* (1901); *Salome*, and *Elegtra* (1908). In 1904 he visited the United States, where he appeared as conductor of performances of his works. His program-music has been the centre of much discussion. Consult Hencker, *Overtures* (1904).

STRAW, n. *straw* [AS. *streow;* Dut. *stroo;* Icel. *strá,* what is *strewed* to lie on, litter (see STREW)]: the stalks or stems of grain after being thrashed, as a bundle or heap of *straw*—usually in the singular form with a plural sense: a single stalk; anything proverbially worthless—though straw is now considered valuable (see STRAW, in Agriculture): ADJ. made of straw, or consisting of it (see STRAW MANUFACTURES): V. to cover with straw; to strew, which see. STRAW'ING, imp. STRAWED, pp. *strawd.* STRAWY, a. *straw'ĭ,* made or consisting of straw; like straw. STRAW-COLORED, a. of the color of straw. STRAWBERRY, a creeping plant and its fruit—probably so called from the resemblance of its runners to *straws,* or from the wandering habit of the plant—strawberry meaning *stray berry* (see below). STRAWBERRY-TREE, shrub named from its fruit resembling the strawberry; the *Ar'bŭtus unēdo,* ord. *Ericācēæ.* MAN OF STRAW, the old clothes of a man stuffed with straw; hence, an imaginary person; a stuffed image.

STRAW, in Agriculture: largely used on the farm for bedding animals in stables, binding corn, feeding to cattle, and various other purposes. In the timberless regions of the west it is sometimes used for fuel, being burned in stoves constructed for the purpose. On new land straw is often wasted, but in older settled regions of the United States it has long been thought necessary to return it to the soil in order to prevent exhaustion of the mineral elements. The introduction of commercial fertilizers (see FERTILIZERS) has modified this view, and where there is a demand for straw it is often best to sell it, and invest the proceeds in fertilizers. The straw of different kinds of grain varies greatly in value: that of rye is much stronger and tougher

STRAWBERRY GROWING IN WISCONSIN.

than that of other grains. At the present writing, long rye S. sells in the New York market for nearly double the price of wheat or oat S., and for about four-fifths the price of good hay. Oat S. has considerable value for feeding to animals; wheat and rye S. also, though inferior, are used to some extent. Before being fed, S. should be run through a cutter, and mixed with corn-meal or some other concentrated food. The quantity of S. produced per acre, and the proportion of S. to the grain which it bears, vary greatly with the soil, season, and conditions of growth and development. High culture tends to increase the proportion of grain. The following may be considered a fair yield per acre and an average proportion of S. and grain:

	Bushels.	Lbs. Grain.	Lbs. Straw.
Wheat	20	1,200	3,000
Rye	25	1,400	3,500
Oats	30	960	2,000
Barley	30	1,440	2,000
Buckwheat	30	1,440	2,000
Flax	30	1,680	2,400

The principal elements of fertility removed from the soil are found in the S. in the following quantities:

	Lbs. Straw.	Lbs. Nitrogen.	Lbs. Phosphoric Acid.	Lbs. Potash.
Wheat	3,000	14·40	6·60	18·90
Rye	3,500	14·00	7·30	27·30
Oats	2,000	11·20	3·80	17·80
Barley	2,000	6·26	5·40	25·80
Buckwheat	2,000	26·00	12·20	48·40
Flax	2,400	18·00	8·59	23·17

STRAW'BERRY [see STRAW], (*Fragaria*): plant of ord. *Rosaceæ*, largely cultivated. It is remarkable for the fact that the edible portion is not the real fruit—which consists of very small seeds scattered on or slightly imbedded in its surface—but is merely the receptacle therefor. The plant is perennial and herbaceous; leaves are produced on long stalks, and the three leaflets are coarsely serrated; the flowers are usually white, and have five petals. Propagation is effected by runners, but new varieties are secured from seed or by hybridization.

There are numerous species, only one of which, *F. vesca*, known as the Alpine or Wood S., is a native of Great Britain. It is indigenous also to the n. part of N. America; and several species are native to the United States. Of the latter, the best known is *F. Virginiana*, found wild from Fla. almost to the n. limits of vegetation, and w. to the Rocky Mountains, and of which there are many varieties. From these two kinds a large part of our cultivated sorts have been derived. A Chilian species, *F. Chilensis*, is found on the w. coast of the United States, and bears large fruit of poor quality. *F. Indica*, a species from upper India, whose fruit is of no value, is found in some of the s. states, and is regarded as an ornamental plant. There are two general classes of S. plants: staminate and pistillate. The former have perfect flowers. In the latter the stamens are either deficient or wanting, and plants of this

class must be grown near those which produce abundance of pollen. When every fifth row is of a good staminate sort, thus insuring perfect fertilization, the pistillate varieties will usually prove much more productive than the unisexual kinds. The yield of berries varies greatly with soil, climate, cultivation, and variety, but frequently reaches 150 bushels per acre, and yields of considerably more than twice that quantity have been reported.

Land for the S. should be moderately dry, very rich, deeply plowed, and thoroughly pulverized. Plants started in the ordinary manner may be set in either spring or fall. They will not yield a full crop till the second summer after transplanting. Potted plants—runners rooted in pots and transplanted with the earth in which they grew—if set in Aug. sometimes yield a large crop the next season, but there is considerable risk of failure. If the hill system is followed, rows are to be at least three ft. apart, and the plants one ft. apart in the row. This requires a large number of plants and a great deal of work in cultivation, but gives fine quality of fruit and large yield. In the matted row system, the rows are about four ft. apart, and the plants two ft. apart in the row. A space one or two ft. wide between the rows is kept clear by the use of the cultivator, but the plants are permitted to spread between the hills. There are various modifications of these systems. Runners should be cut off till after the fruit has formed. Weeds must be kept down, but cultivation late in the season is not desirable. In cold regions, unless the ground is covered with snow, straw or leaves should be spread between the rows and hills to protect the roots from injury by alternate freezing and thawing of the surface of the ground. This material should be free from the seeds of grass or weeds, must not be put on till the ground freezes or snow falls, and in spring is to be drawn between the rows, where it will serve as a mulch. In some cases a S. bed is kept for three years; but many growers prefer to make new beds each year, and plow the field as soon as one full crop has been secured.

The length of the picking season varies, with the locality and the varieties produced, from two to four weeks. The berries are picked, in the cooler portions of the day, into quart boxes; and are shipped in crates holding 32 boxes each. When the old beds are retained, the land must be kept rich by use of manure or commercial fertilizers. Some growers burn over the field after the fruit has been removed, in order to destroy weed seeds, insects, and dead leaves, also to improve the mechanical condition of the soil; but many consider the practice of doubtful utility. The principal enemies of the S. are the larvæ of the June-bug, which feed on the roots, and often are very destructive in land which has recently been in grass; and two classes of borers, one of which attacks the crowns and the other the roots of the plants. The former may be largely avoided by setting plants only on land previously under cultivation. Plants attacked by borers should be pulled up and burned. Various explanations of the name S.

have been made, but none satisfactory. The idea that it was derived from the custom of placing straw around the plants is certainly incorrect. It is more probable that it came from the Anglo-Saxon word *strae* (stray) and had reference to the wandering propensities of the plant. The S. has been cultivated in England more than 450 years. In this country special attention was called to the fruit about 1835 by the introduction of a greatly improved variety originated by C. M. Hovey, of Cambridge, Mass., and known as Hovey's Seedling. There are now (1891) a great number of varieties under cultivation, many of which are remarkable for productiveness and for size and fine quality of fruit. On account of the improved means of transportation, the S. season in the New York market, formerly limited to about three weeks, now extends over nearly four months. The earliest fruit comes from Fla., and the latest from N. Y. and some of the New England states. A small quantity also is grown under glass, and is sold out of season, in the large cities, at enormous prices.

STRAW-MANUFAC'TURES: industrial applications of straw. These are of great commercial importance, especially that of plaiting, one of the oldest arts practiced by mankind, many specimens having been found in the tombs of the ancient Egyptians, and mention being made of plaiting by Herodotus and other early writers. The earliest notice of its systematic use in Europe as an article of clothing is in the records of the reign of Mary, Queen of Scots, who, we are told, observed that the peasants of Lorraine wore hats made of straw plait, and introduced it into Scotland 1562, but without much success. Her son, James I., carried it into England, where it soon throve, becoming a permanent industry. It was regularly established first in Bedfordshire, which has ever since been its chief seat.

At first, the plait was what is called *whole straw*—that is, the straw was cut into suitable lengths without knots, and merely pressed flat during the operation of plaiting; and so it continued until the reign of George I. Later, split straw chiefly has been used. The splitting instrument now employed (fig. 1) is of steel, and consists of a number of little square blades set circularly around the stem, which at one end terminates in the point *a*, and at the other is bent and fixed into the handle *b*. The point *a*, being inserted into the hollow of the straw, is pressed forward, and cuts it into as many strips as there are blades in the cutting-tool; these vary in number according to the fineness of the work to be produced.

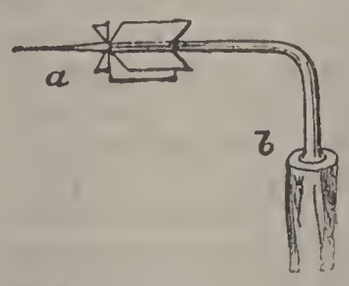


Fig. 1.

It is found that the fine straw-plaiting can be made from only one or two varieties of wheat, that called the White Chittim being generally preferred, and next to it the Red Lammas. The harvesting is a matter of great anxiety, as

the straw is liable to many injuries from wet and other causes. The value of this crop appears in the fact that an acre will yield 25 to 40 bushels of wheat and from 15 cwt. to a ton of straw.

The ears are cut off by hand for thrashing. The straws are afterward cut into lengths, and cleared of the outer sheath or leaf; they are then sorted into various thicknesses by an apparatus consisting of a series of sieves about eight inches in diameter, arranged as in fig. 2, *a, a, a, a;* the boys who usually do this work hold

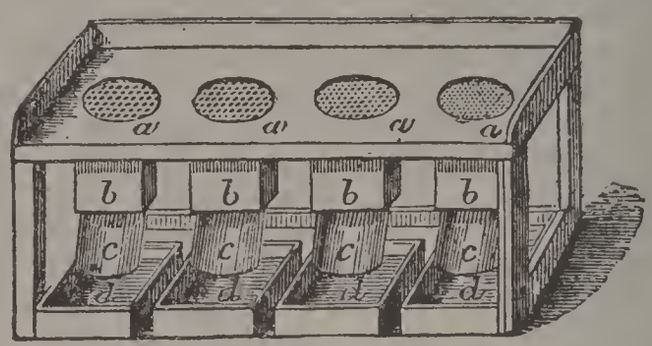


Fig. 2.

a handful on end over the first sieve, which has the narrowest spaces, and the thinnest straws only fall through it; the straws are next placed on the second, and so on to the last. As they fall through each successive sieve, they pass down the hollow shafts *b, b, b, b,* by the shoots of tin or sheet zinc *c, c, c, c,* into the boxes *d, d, d, d,* from which they are removed and tied into bundles ready for the splitters, who reduce them to strips of the sizes required.

The plaits are made largely by women and children in their homes. They are very various in pattern and in price.

In the United States the straw-manufacturing industry was begun in New England, and for many years was confined to the coarse grades of hats. About 1800, manufacturers in England began making hats of finer grade, and soon afterward in Connecticut a similar improvement was attempted. In 1822 the British Society of Arts awarded a silver medal and 20 guineas to Sophia Woodhouse, of Connecticut, for having made unusually fine plaits, from a new material, thought to be equal to the best Italian straw. At that time several establishments in New England were engaged in straw-hatting; but the choicest hats were either imported from Leghorn or Tuscany, Italy, or from the Dunstable factories, England; or were made here from imported Italian material, which came in flats and braids. The development of the industry was accelerated by improved machinery, till in the entire process of braiding, plaiting, forming, and sewing there was little need of hand labor. Nearly all the material is imported, and reaches the manufacturer in an advanced stage of preparation. The finest comes from Leghorn, Tuscany, Bohemia, and

Switzerland; the medium grade from China (Canton), Japan, and several countries in s. Europe, and the cheap grade, as the Mackinaw, from Canada. Chip and Panama hats, though often sold for straws, are made from other materials; the chip from the splints of the Lombardy poplar after the sap has been dried out thoroughly, the Panama from the immature leaves of a palm-tree indigenous to South America and Cuba. Besides its value for plaiting, straw is now much used in the manufacture of Paper (q.v.); and as a cheap component part of other articles.

STRAY, v. *strā* [OF. *estraier*, to stray—from mid. L. *extrārĭus*, a stranger, a beast that has lost his master—from L. *extra*, on the outside]: to wander, as from a known place, from a company, or from proper limits; to ramble; to err; to go at large; in *OE.*, to mislead: ADJ. having gone astray; wandering: N. an animal that has wandered. STRAY'ING, imp.: N. act of going astray. STRAYED, pp. *strād*. STRAYER, n. *strā'ėr*, one who strays. —SYN. of 'stray, v.': to wander; deviate; swerve; rove; ramble; roam.

STREAK, n. *strēk* [Low. Ger. *streke;* Dan. *streg*, a streak: Ger. *streich*, a stroke: Dut. *streek*, a line marking the course of a blow: Gael. *strioch*, a line]: a line or long mark of color different from the ground; in *min.*, that appearance which the surface of a mineral presents when scratched by a hair instrument, or the appearance which a mineral leaves on a rough porcelain slab when forcibly drawn or stroked along its surface; in *bot.*, a straight line formed by a vein, by color, or by indentation; a range of planks running fore and aft on a vessel's side—also called a *strake:* V. to variegate with lines of a different color; to stripe. STREAK'ING, imp. STREAKED, pp. *strēkt*, marked with lines of a different color. STREAKY, a. *strēk'ĭ*, variegated with lines of a different color.

STREAM, n. *strēm* [Icel. *straumr;* Dut. *stroom;* Sw. and Dan. *ström;* Ger. *strom*, a stream]: a flowing water; a current of water or of any liquid; anything issuing or proceeding in a line or continuous body, as gas, air, light, a multitude of people, etc.; a river; anything moving onward in a continuous course: V. to move onward in a continuous course; to flow, as a liquid; to pour out in abundance; to pour; to send forth; to throw a stream. STREAM'ING, imp.: ADJ. flowing; emitting a stream of anything. STREAMED, pp. *strēmd*. STREAM'ER, n. *-ėr*, that which streams or floats; a flag or pennon floating in the wind. STREAM'ERS, n. plu. *-ėrz*, popular name for the aurora borealis; northern lights. STREAM'Y, a. *-ĭ*, abounding with water. STREAM'LET, n. *-lĕt*, a little stream. STREAM-ANCHOR, a ship's anchor, lighter than the bower-anchor. STREAM-ICE, a continued ridge of pieces of ice running in a particular direction. STREAM-TIN,

rolled fragments of tin-stone, found mingled with gravel, etc., in the gullies and water-courses of Cornwall. GULF STREAM: see under GULF, STREAM-WORKS, workings in the loose clays, gravels, sands, etc., which cover the valleys of a country, and from which the metal or ore is obtained by repeated washings.—SYN. of 'stream, n.': current; tide; course; rivulet; burn; flow; rush; gush.

STREATOR, *strē'ter:* city in La Salle co., Ill.; on the Vermilion river, and on the Chicago, Burlington and Quincy, the Atchison, Topeka and Santa Fe, the Wabash, the Indiana, Illinois and Iowa, and the Chicago and Alton railroads; nearly 100 m. s.e. of Chicago. In 1868 the place was laid out for a city, and in 1882 it was incorporated. A large part of the city is on high bluffs along the river. It is in a fertile agricultural region in which there is considerable coal, fire-clay, and building stone. The manufacturing establishments include brick and tile works, glass factories, flour mills, machine shops, planing mills, and foundries. The glass manufactures are Bohemian ware, bottles, flint glass, plate-glass, and window glass. The clay products are sewer pipe, tile, and brick. The government census of 1900 gives the number of manufacturing establishments 131; the amount of capital invested $1,050,999; the number of wage-earners, 1,564; the annual amount of wages, $772,-187; the cost of material, $578,128; and the value of the products, $1,761,143. The trade is chiefly in manufactures, coal, grain, live-stock, and dairy products. The principal public buildings are the government building, municipal buildings, an opera house, a Y. M. C. A. building, and 25 churches, St. Mary's Hospital, and a home for the aged. The educational institutions are a high school, 18 public schools, 4 parish schools, kindergartens, private commercial schools, a city library, and the Y. M. C. A. library and reading rooms. The 3 national banks have a combined capital of $250,000. There are several building and loan associations and a large number of fraternal societies. Pop. (1910) 14,253.

STREEL, v. *strēl* [Gael. *srol,* a banner, a thing loose which floats or flutters]: in *Ireland,* to trail on the ground, as a long dress; to drag carelessly along the ground. STREEL'ING, imp. STREELED, pp. *strēld.*

STREET, n. *strēt* [Dut. *straat;* Ger. *strasse;* It. *strada,* a paved way—from L. *strātum,* a pavement—from *sternĕrĕ,* to lay down]: *anciently,* any paved road; hence, a way or road in a town, usually lined or intended to be lined with houses on one or both sides; a public place (see ROADS AND ROAD-MAKING; PAVEMENT). STREET-CROSSING, a carefully paved part of a street for foot-passengers crossing from one side to the other. STREET-DOOR, front or entrance door of a house. STREET-WALKER, a common prostitute, as soliciting on the public

streets.—SYN. of 'street': road; highway; lane; alley; by-way.

STREET, *strēt,* ALFRED BILLINGS: author: 1811, Dec. 18—1881, June 2; b. Poughkeepsie, N. Y. He studied law with his father, and practiced in Monticello, N. Y. In 1839 he removed to Albany, and 1843-4 edited the *Northern Light;* from 1848 until his death was state librarian. He wrote much for publication both in prose and poetry. A number of his poems have been translated into German. Among his works are: *The Burning of Schenectady, and Other Poems* (1842); *Frontenac,* poetical romance (1849); *Woods and Waters, or the Saranacs and the Racket* (1860). He died at Albany.

STREET, AUGUSTUS RUSSELL: 1791, Nov. 5—1866, June 12; b. New Haven, Conn. After graduating from Yale 1812, he studied law, but, his health being poor, he did not practice. He travelled in Europe 1843-48. The fortune which he inherited was largely given to Yale College for the establishment of its admirable school of fine arts, a professorship of modern languages, and a chair in the theological department. His daughter became the wife of Admiral Foote. He died at New Haven.

STREET, GEORGE EDMUND, R.A., F.SA.: architect: 1824-1881, Dec. 18; b. Woodford, Essex, England. He was educated at Camberwell, and studied architecture with the best teachers. In 1847 he won one of the £100 prizes for a design for a new foreign office; and 1850 was appointed architect for the diocese of Oxford, and later for those of York, Ripon, and Winchester. In 1855 he published *The Brick and Marble Architecture of Italy;* and 1865 *The Gothic Architecture of Spain,* beautifully illustrated with his own drawings. Among his numerous and important architectural works are the nave of the Bristol Cathedral; the Crimean Memorial Church, Constantinople; and the new Courts of Justice in London. He was buried in the nave of Westminster Abbey.

STREET CLEANING: a term to include all operations of the municipal department charged with keeping the streets free from litter which might affect the public health or comfort, or offend the public taste. In the larger cities of the world the work consists of the daily sweeping of all paved streets; the collection of house refuse—garbage, ashes and light waste—when deposited by the householder in cans on the sidewalk or adjacent thereto; the removal of dead animals from the street; summer sprinkling to lay the dust; and the disposal of snow in winter. In small communities the term covers only the more pressing of these functions—the removal of dead animals and household garbage and ashes, with a spring cleaning of the streets after the melting of winter snows, and an autumn cleaning after the fall of the leaves.

STREET CLEANING.

The routine work of street cleaning and the removal of household waste is performed by men regularly employed by the department; while work which varies much with the season, such as the removal of dead animals, street sprinkling and the disposal of snow, is, in most cities, let to contractors who are subject to the call of the department, but are better able to supply the frequently sudden demands for large forces of men and teams.

For a long time in Europe, and of late in America, the men of the departments of street cleaning have been protected in their employment by civil service rules, which insure their positions during efficiency and good conduct; and in Europe they receive pay during sickness and pensions on retirement. This has had the usual effect of providing a class of men suited to the work and contented with their positions, and in raising to a high order the morale of the departments. In Europe the men sometimes wear distinctive caps or some other badge of employment, and in Berlin and Turin they wear a modest uniform; but it is evident that the men of any street cleaning force *should* be distinctively garbed to insure for them the respect which is always accorded to members of a uniformed body, and, in the case of street sweepers, to insure their safety from passing vehicles. To Col. George E. Waring, commissioner of street cleaning of the city of New York 1895-7, is due the credit of having clothed all his street sweepers in white, because this is most conspicuous on a crowded street and will conduce most to the safety of the men and the efficiency of the department; and because these uniforms, to be kept white, must be thoroughly washed and always in good sanitary condition. So well has this order served its purpose that the custom has spread to nearly all the large cities of the country, and 'white wings' are seen at work on every street.

The degree of cleanliness attainable in any city, and indeed in any street, varies with the character of the people and their education in sanitary matters, and depends largely upon their co-operation. In many of the older and larger cities of Europe—Vienna, for example—where strict obedience to law has long been rigidly enforced, each householder keeps his portion of the sidewalk uniformly and always clean, having it sprinkled and swept twice daily in summer and kept clean in winter; while in New York few householders regard it as a duty and a point of honor to keep their individual sidewalks clean in summer and free from snow and ice in winter. In New York it is not uncommon to see a newspaper dropped on the street with no public protest, whereas in Europe such an act would almost certainly cause a man's arrest if he refused to pick up the paper. There are streets in New York where one sweeper keeps clean 20,000 sq.yds. of pavement; there are other streets, in the

crowded districts, where one man's work is to keep clean 1,000 sq.yds. In the latter case the pavement is laboriously swept seven times daily; and it is to the credit of New York that, as nearly as possible, the streets of the tenement district are as well kept as the streets of the residential portion, though they cost on the average three times as much.

The various elements of difficulty which affect the cost of street sweeping were carefully studied by the late Commissioner Waring, and in his classic report to the mayor of New York at the close of his administration this subject is exhaustively treated. The results are worthy of serious consideration not alone by city administrators but by the people at large. It has been supposed by the public that the cost of street sweeping depends principally upon the kind and condition of pavement, and it has been frequently stated that if all paved streets were surfaced with asphalt the work of the street cleaners would be reduced at least one-half; but from Commissioner Waring's investigation it is evident that the character of the pavement is only one, and not the greatest, of several factors in the total. The report considered in succession 13 factors which were deemed to be beyond the control of the department, and for each was determined approximately its relative difficulty. The 13 factors chosen and the relative difficulties determined are as follows:

(1) Kind of pavement—asphalt, 100; wood, 100; brick, 100; granite, 150; Belgian block, 160; cobble, 400.
(2) Condition of pavement—good, 100; fair, 120; bad, 140.
(3) Amount of traffic—light, 100; medium, 140; heavy, 180; dense, 250.
(4) Amount of car track—on basis of 30-ft. street with single track.
(5) Kind of car track rail—none, 100; flat or grooved, 110; T-rail, 120.
(6) Amount of sanding—little, 110; much, 120.
(7) Amount of sprinkling—heavy, 125.
(8) Elevated railroad—110.
(9) Character of population—good, 100; fair, 200; bad, 300.
(10) Presence of schools—110.
(11) Existence of markets—125; or (12) Push-cart stands—175.
(13) Vicinity of unpaved streets—200.

That a street bears heavy traffic is seen to have more influence on the labor of sweeping than that it has granite instead of asphalt pavement. The amount of traffic affects the cost for four reasons: (1) Because of the amount of horse droppings; (2) because of the dirt of one kind and another which comes from the wagons; (3) because the passage of horses and wagons effects a solid packing, into crevices, of the dirt upon which they tread; (4) because of the difficulty of giving close attention to his work when the sweeper must devote a considerable part of his time to dodging horses and vehicles.

STREET CLEANING.

But no other single cause contributes so much to the difficulty and expense of sweeping as the action of careless and thoughtless persons in making the public streets the receptacle of all kinds of rubbish—fruit parings, bits of paper, etc.—of which they wish to be rid, and which a little consideration would induce them to deposit in some can which might be emptied into a cart without the trouble of sweeping and shoveling from the pavement. Of late there has been a marked improvement in this respect in the cities of the United States due to education in matters of cleanliness brought about by the university and college settlements, the teachers of the public schools, and especially the juvenile leagues, which are organizations of children in the crowded districts for the purpose of enlisting their aid in the matter of street neatness.

By measuring the area of each block and multiplying this by the numbers corresponding to its various difficulty factors there was obtained for each block the sum of its principal difficulties expressed in terms of square yards of asphalt pavement, in good condition, with light traffic, with no car-track, with good population, and with all other conditions favorable; and from these was obtained a summation for the territory now covered by the boroughs of Manhattan and the Bronx; and it is interesting to note how the total requirement of 1,638 sweepers is made up. Were the pavement all asphalt and the population all neat in their habits, were there only light traffic and no street car-track, were there no push carts and no market stores, were every consideration ideal, there would still be required for sweeping the streets a force of 466 men. The density and character of the population on a few blocks of the city make necessary 388 more. The great amount of traffic in some streets calls for 352 extra men to clean up after it. The added difficulty of granite and Belgian pavement requires 200 men, and so with the other factors in lesser amount.

Machine sweepers (horse or automobile) lessen the cost of street cleaning, and may be used to advantage with preliminary sprinkling on wide, level, well paved streets, between midnight and dawn; but their service on crowded streets in daytime is impracticable.

A fall of snow is such an impediment to city traffic, which is usually conducted on wheels even in winter, that it is recognized as a duty of the departments of street cleaning to remove it promptly from important streets, especially from the lines of daily food distribution and from the avenues of daily approach to the business districts. The numbers of men and teams suddenly required are very large, and dumping facilities are in general quite inadequate to the work. The cost is also great—about $125 per mile of street per inch of snow, or $1,250 per mile of street for a 10-inch fall.

For these reasons numerous efforts have been made to develop practical processes for melting the snow as it lies, or at least on the block where it lies, and running the water into the nearest sewer opening. Machines for the purpose have been tried in many cities for many years, but have usually proved unequal to the task either because of the cost of melting, or of the slowness of melting, or because the machine could not stand the hard usage to which it was subjected in some streets. It is universally hoped, however, that with continued study and experience some form of snow melting apparatus may be developed to help out the always limited supply of men, carts and dumping facilities, when the traffic of a city is suddenly paralyzed by a heavy snowfall. There is no insuperable difficulty in the matter, because the ordinary cost of removal is at least 30 cents per cubic yard and the cost of fuel should not be one-tenth of this.

The benefit of careful and thorough street cleaning throughout the year, and of thorough sprinkling during dry weather, is seen in the improved health of the people, especially of the populous districts where the pavements are the only playground for children. A great betterment in the condition of the streets of the tenement district of New York was effected in the years 1895-7, and to it the medical authorities of the city ascribe the decrease in the death rate from 25.95, 25.30, 22.76 in 1892-3-4, respectively, to 23.18, 21.84, 20.03 in 1895-6-7, respectively. In all street dirt disease germs lurk in unknown numbers, and when the dirt is dry and dust is raised by passing traffic or by winds, the dust and the germs find lodgment in eyes, nostrils and mouths, and the work of disease is begun. Of course, the dust and the germs are the thicker the nearer the pavement, and no other cause is necessary to explain why the children of the crowded streets are so affected. Careful experiments lately carried out in New York by Commissioner Woodbury, with germ cultures from plates exposed some at the curb level and some at 6 ft. above, exhibited a wonderful difference in the number of germs which found lodgment on the plates in different parts of the city. At the curb level the evidence of the plates showed on the average five times as many germs as at 6 ft. above. In a tenement district densely populated, where push carts are numerous and traffic heavy, as many as 9,600 germs were caught in a 15-minute exposure of a plate 2¼ in. in diameter. In another part of the city, in a residential district with heavy traffic but well flushed pavement, only 54 colonies were found after a 15-minute exposure.

The relative costs of street cleaning in different cities of the world are impossible of comparison, because the conditions and the standards of cleanliness vary so much, and because the work of the department has no-

where been reduced to an exact science. But in general the cost in Europe is much less than in America, because of the greater waste and carelessness of the average American citizen, and because the lower cost of living in Europe and the general introduction abroad of civil service rules enables the departments there to hire men at one-quarter the wages paid in America. The cost of street cleaning in Manhattan and the Bronx, including the collection and removal of house waste, but not the removal of snow, is about $7,000 annually per mile of street. When the commissioner is competent, this amount of money ensures an excellent condition of the streets; when he is incompetent, the same amount of money is provided and spent, but the citizen suffers. In Vienna, where only some 25 miles of street in the heart of the city is kept thoroughly clean, the annual cost in this section, excluding snow removal, is about $5,000 per mile. In Budapest, where the pavement is excellent and where much value is recovered by sorting the wastes, the annual cost is not far from $2,000 per mile. In Paris it is about the same. In Brussels the cost is about $1,350 per mile. In Birmingham, England, the cost is still less, though wages are higher than on the continent.

STREIGHT, a. *strāt* [L. *strictus*, straight, tight (see STRAIT)]: in *OE.*, strict; limited; spare: N. a strait; difficulty: AD. strictly.

STRELITZ, *strĕl'ĭts*, properly *Streltzi* (arquebussiers): ancient Russian militia-guard, raised first by Ivan Vassilevitch the Terrible, in the second half of the 16th century. At that time and long afterward they were the only standing army in Russia, numbering sometimes 40,000 to 50,000 men. They were located at Moscow in time of peace, in a quarter of the capital set apart for them; and, being the bravest and most trustworthy troops in the army, received special favor and distinctions. But like all such petted corps, the Roman Pretorians, the Turkish Janizaries, and the Egyptian Mamalukes, their general turbulence, frequent revolts against the government (notably during the Demetrian insurrections), and incessant conspiracies, rendered them more formidable to the Russian government than to external enemies. The strelitz having, at the instigation of the Grand Duchess Sophia and the chiefs of the Old Muscovite party, revolted against Peter the Great, that iron-handed ruler caused them to be decimated (1698) in the great square of Moscow, and the remainder to be banished to Astrakhan. The feeble remnant still manifesting their characteristic turbulence and disloyalty, Peter exterminated them almost completely 1705.

STREMMA, n. *strĕm'a* [Gr. a twist, a strain—from *strephō*, I turn, I twist]: in *pathol.*, a strain or sprain of the parts about a joint.

STRENGTH, n. *strĕngth* [from STRONG, which see]: the muscular power or energy which animals can exert at will; solidity; firmness; quality of sustaining or resisting the application of external force; power or vigor of any kind; power of mind; support; spirit; animation; soundness; legal force; confidence imparted; quality of affecting bodies; or of producing sensible effects on them: richness in any character or ingredient, as alcohol in wine; potency of liquors; amount of force; military or naval force; in *OE.*, fortification; fortress. STRENGTH'LESS, a. *-lĕs*, without strength. STRENGTHEN, v. *-n*, to add strength to; to grow stronger; to fix in resolution; to invigorate; to confirm. STRENGTH'ENING, imp.: N. process by which anything is strengthened. STRENGTH'ENED, pp. *-nd*. STRENGTH'ENER, n. *-n-ĕr*, one who or that which strengthens; a medicine which adds strength to the body. ON or UPON THE STRENGTH OF, in reliance upon; in confidence imparted by. —SYN. of 'strength': support; security; validity; armament; force; power; robustness; toughness; hardness; stoutness; brawniness; lustiness; firmness; confidence; energy; authority;—of 'strengthen': to invigorate; establish; fortify; animate; encourage.

STRENGTH OF MATERIALS: subject of that department of engineering which deals with stresses in parts of structures. The strength of materials depends on their physical constitution—viz., their form, texture, hardness, elasticity, and ductility.

The resistance of materials in engineering works is tested in reference to various strains: such are—1. Extension or tension; 2. Compression or crushing; 3. Transverse or cross strain; 4. Shearing strain; 5. Torsion or twisting strain.

1. *Extension.*—When a rod is suspended vertically, and a weight attached to its end tending to tear it asunder, all its fibres act equally, and its strength evidently depends on the strength of the individual fibres and their number—that is, the area of cross-section of the rod. The following table gives the resistance to *rupture* of some of the most common materials:

	Per. Sq. Inch.
Fine sandstone	200 lbs.
Brick	300 "
Common lime	50 "
Portland cement	240 "
Deal (timber)	5 tons.
Cast-iron (ordinary)	6½ "
" Stirling's toughened	12½ "
Wrought-iron, boiler-plate	20 to 24 "
" bars	25 "
Cast steel	60 "

Ropes (hemp), four-fifths ton per pound-weight per fathom.

Regarding elongation of materials under tensional strain, it has been observed that to a certain limit, differing for different substances, the elongation is proportional to the extending force, a physical fact whose promulgation is due to Hooke (q.v.); to this limit also the body recovers nearly its original form on removal of the force: this limit is called the limit of elasticity. When this limit is passed,

the permanent elongation or destruction rapidly increases until rupture takes place.

The extension of wrought-iron is about $\frac{1}{10000}$ of its length per ton of strain per sq. inch, and that of cast-iron $\frac{1}{5000}$. The limit of elasticity of wrought-iron is attained under a strain of 12 tons per sq. inch; and in the case of American pine $1\frac{1}{3}$ ton per sq. inch.

2. *Compression or Crushing Strain.*—The strength of pieces of stone, wood, or iron, whose height is small in proportion to their area, and which absolutely crush under the strain, is proportional to the area of their horizontal section. The following table gives the resistance to crushing of some common materials:

Cast-iron	50 tons per sq. inch.
Wrought-iron	16 " " "
Brickwork	30 tons per sq. ft.
Sandstone	200 " " "
Limestone	490 " " "
Deal	450 " " "
Oak	650 " " "

As far as to a certain strain, called the limit of elasticity, the diminutions in length of the body are proportional to the compressing force; and are practically the same in amount as the elongations in the case of tensional forces. In wrought-iron the limit is 12 tons per sq. inch; after that strain, its shape and proportions become permanently altered; and where these are of consequence, as in most practical cases, we come to the limit of its utility, which is reached when the load is about 16 tons per sq. inch. It then oozes away beneath additional strain, as a lump of lead would do in a vise.

The mode of ultimate failure of cast-iron is quite distinct from that of wrought-iron. It crushes suddenly by the sliding off of the corners in wedge-shaped fragments, being a crystalline mass without sufficient ductility to allow its bulging horizontally; the angle of rupture at which these wedges slide off being approximately constant, varying from 48° to 58°. The limit of elasticity is attained in cubes of deal under a compression of 100 tons per sq. ft.; and in those of oak, 150 tons per sq. foot.

Pillars, round or square, may be divided into three classes—1. Those whose height is not more than 5 times their diameter; 2. Those whose height is between 5 and 25 times their diameter; 3. Those whose height is at least 25 times their diameter. The first follow the same laws as cubes or pieces of small height above discussed, and are absolutely crushed; their strength being proportional to their cross section. The second are broken across, partly by crushing, partly by bending. The third give way purely from bending as with a transverse strain, and their strength is found by experiment to be directly proportional to the fourth power of their diameter, and inversely proportional to the square of their length. Thus, in the case of two long pillars of equal length, but of which one has its diameter double that of the other, the strength of the former will be 16 times that of the latter; from which will be apparent the advantage of the tubular form for

pillars, as it gives large diameter combined with lightness.

In the case of long columns whose length is 25 or more times their diameter, if we represent the strength of a long cast-iron column of any dimensions by 1,000, the strength of a wrought-iron column of the same dimension will be 1,750; of cast steel, 2,500; of Danzig oak, 110; of red deal, 80.

3. *Transverse or Cross Strain.*—When a beam fixed at one end is loaded with a weight at the other, it is bent from its original form, and takes a curved shape. The fibres on the upper or convex side of the beam are extended, and those on the under or concave compressed; while at the middle of the beam, there are fibres which are neither extended nor compressed, where the compression ends and the extension begins: this surface of fibres is called the neutral surface. As long as the beam is not strained beyond the limit of its elasticity, the extensions and compressions for a given strain are nearly equal, and therefore the neutral surface passes through the centre of gravity of the cross section of the beam.

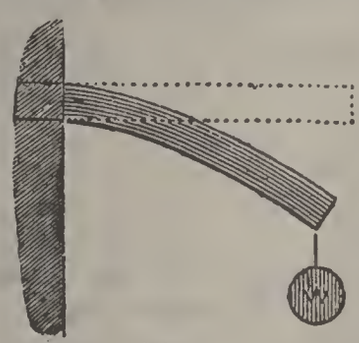


Fig. 1.

If we strain the beam beyond this limit, and approach the breaking strain, the extensions and compressions are no longer equal, and therefore the position of the neutral surface is not readily determined; e.g., in the cases of stone and cast-iron, the amount of compression is much less than that of the extension, and in the case of timber greater. Also the extensions and compressions are no longer proportional to the strains. For these causes the position of the neutral axis, and the amount of strain on the different parts of the cross section at the moment of rupture, cannot be determined by theory.

Different theories have been proposed to determine the relative strength of similar beams, while their absolute strength is left to experiment. That of Galileo consists in supposing the beam incompressible, and that it gives way by extension turning round the lower edge, each point of the section giving an equal resistance before rupture. That of Mariotte and Leibnitz supposes the beam in like manner to turn round its lower edge, but considers that the resistance given by each point of the section is proportional to its distance from that edge.

The theory now generally adopted consists in supposing the extensions and compressions to continue to the point of rupture proportional to the strains, as is actually the case as far as the limit of elasticity; and therefore, that the beam turns round a neutral axis, passing through the centre of gravity of the cross section, the force given out by each point being proportional to its distance from the neutral axis. This last theory is found to give the best results in the case of timber and wrought-iron, especially wrought-iron arranged in the forms usual in girders. The

second represents nearly the method of failure of stone, and the first that of cast-iron.

Though none of these theories give accurate results, they yet give means of determining, from particular experiments, the strength of any other beam whatever. E.g., these theories agree in giving the strength of a rectangular beam to be proportional to the area of cross section multiplied by the depth, and inversely proportional to the length of the beam, since the strain increases directly as the length. This, when expressed mathematically, is

$$W = C\frac{bd^2}{l} \qquad \text{(I.)};$$

where w = breaking weight in tons.
b = breadth of beam in inches.
d = depth of beam in inches.
l = length of beam in inches.
C = a constant number for beams of the same material, to be determined by experiment.

This result is borne out by experiment—i.e., the constant C being determined by experiment on one beam, the strength of any other is found by multiplying its breadth by the square of its depth and by the constant C, and then dividing by its length. In the case of a beam supported at each end and loaded by a weight in the middle, as in fig. 2; the strength is given also by the formula,

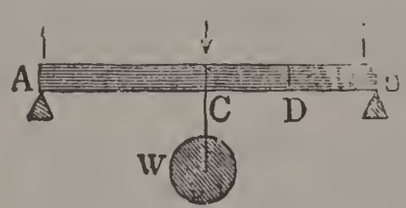


Fig. 2.

$$W = c\frac{bd^2}{l} \qquad \text{(II.)};$$

but c, in this case, is 4 times the value of C in the formula for a beam loaded at one end. The truth of this appears from the consideration that the beam ACB, fig. 2, may be treated as if it were two beams, each fixed at the point C at one end, and pressed upward by the reaction of the supports at A and B, their other ends. This reaction is evidently equal to $\frac{W}{2}$; so that the breaking weight of the whole beam ACB, supported at both ends, resolves itself into that of the beam CB or AC of length $\frac{l}{2}$, acted on by the weight at one end $\frac{W}{2}$; this by formula (I.) is,

$$\frac{W}{2} = C\frac{bd^2}{\frac{l}{2}}$$

$$\text{or, } W = 4C\frac{bd^2}{l} = c\frac{bd^2}{l};$$

$$\text{therefore, } c = 4C \text{ or } C = \tfrac{1}{4}c.$$

Experiments on the transverse strength of beams are made usually in the manner of fig. 2. The following table, from experiments, gives the value of c for beams supported at each end and loaded in the middle:

	Tons.
Cast-iron	$13\frac{1}{2}$
Wrought-iron	12
English oak	$2\frac{1}{7}$
Red pine	$2\frac{4}{5}$

These numbers when substituted in the formula give the breaking weight; $\frac{1}{3}$ of this will be the safe load in practice. The transverse strength of cast-iron is considered so good a test of its value, that in specifications of iron-work, it is generally required to be of such a quality that a bar of it, of certain dimensions, will bear a specified weight at the centre; e.g., 'that a bar of it, 42 inches long, 2 inches deep, and 1 inch wide, set on bearings 36 inches apart, shall bear, without breaking, 30 cwt. suspended in the middle.' If a beam be loaded uniformly over its length, as in fig. 3, it will bear twice as much as if the load be condensed at the centre, as in fig. 2. Also, if the load be placed some distance from the centre, as at D, fig. 2, the load it will bear is to the load borne at the centre, C, inversely as the rectangles of the segments into which the beam is divided by the point of application of the load are to one another, that is, as AC $\times$ CB or $\frac{l^2}{4}$ is to AD $\times$ DB, from which it follows that it will bear less weight at the centre than at any other point.

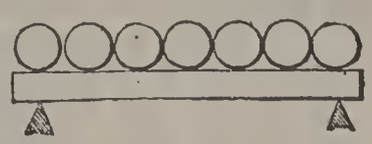


Fig. 3.

Since the strength of a rectangular beam is proportional to the square of the depth, multiplied by the breadth, it is evident that by increasing the depth and diminishing the breadth we shall, to a certain limit, increase the strength of a beam without increasing its weight; e.g., let A and B, fig. 4, be the sections of two beams, of which A is 2 inches broad and 2 deep, and B 4 inches deep and 1 inch broad, they are of the same sectional area, viz., 4 sq. inches, but the strength of B is to the strength of A as $4^2 \times 1$ is to $2^2 \times 2$, or as 16 to 8, that is, 2 to 1, i.e., B is twice the strength of A. Hence arises the advantage of the double T forms so generally used in iron girders, fig. 5, the strength of which forms are proportional to the area of the top or bottom plates multiplied by the depth. For a beam of the form in fig. 5, loaded as in fig. 2, the following formula will give the breaking weight:

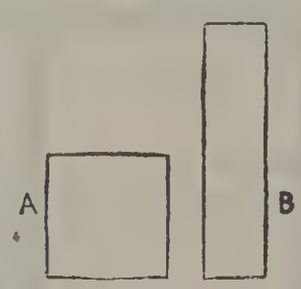


Fig. 4.

Fig. 5.

$$W = C\frac{ad}{l}:$$

where a = the area of the top or bottom flange in sq. inches.
C = 4 times the destroying load per sq. inch of the material, under direct tension or compression in tons.
d = depth of the beam in ft.
l = length between supports in ft.
W = breaking weight at the centre in tons.

For cast-iron beams, when the area of the bottom flange is made 6 times that of the top, which has been found by experiment the best arrangement, and the strength is measured by the tensional strain, supported by the bottom flange, that is, $6\frac{1}{2}$ tons per sq. inch,

$$C = 6\tfrac{1}{2} \times 4 = 26 \text{ tons.}$$

For wrought-iron beams,

$$C = 4 \times 20 = 80 \text{ tons for the lower flange, and}$$
$$C = 4 \times 16 = 64 \text{ tons for the upper flange.}$$

Another way of throwing the great body of the material at a distance from the neutral axis is to make it into the shape of a tube or hollow cylinder. Let B be the section of a hollow cylinder, the thickness of whose walls is represented by the shaded ring; and A be the section of a solid cylinder of the same material. If the area of A is equal to that of the ring in B, the two cylinders will contain the same quantity of matter, but B will be stronger than A, nearly in proportion as *cg* is longer than *dg*.

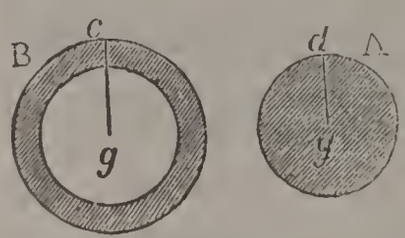


Fig. 6.

The principle of hollow structure prevails both in nature and art, wherever strength and lightness have to be combined. It is seen in the stems of plants, especially of the grasses; also the bones of animals are hollow, and those of birds, where great lightness is required, are most so. A feather, with its hollow stem, is perhaps the best instance of the union of strength and lightness. In art, again, we have hollow metal pillars; and sheet-iron for roofing and other purposes is *corrugated*, or bent into ridges and furrows, to give it depth. Each ridge or furrow is, as it were, half a tube, and resists bending with twice or thrice the energy that it would exert if flat.

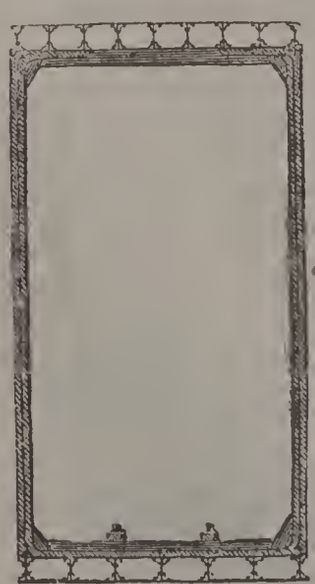


Fig. 7.

The most striking application of the principle of hollow structure is seen in tubular bridges. Fig. 7 represents a section of the tube of the Conway Bridge. The object being to resist a vertical strain, the form is made rectan-

gular, and the chief mass of the material is thrown into the top and bottom. The tube may, in fact, be considered as an immense beam or girder constructed on the principle of fig. 5, the top and bottom being the two flanges, and the two sides serving to connect them, instead of the one rib in the middle. As it is constructed of plate-iron, the top requires more metal than the bottom, in order to resist the compression; but instead of putting the metal into one thick plate, or into several plates laid the one on the other, it is made to form a set of minor tubes or cells, which give additional stiffness and strength to the whole tube. The floor, in like manner, contains cells. Each of the tubes over the Conway is 24 ft. high, 14 ft. wide (outside), and 420 ft. long, and weighs 1,300 tons; yet these enormous hollow beams sustain not only their own weight, but the heaviest railway-trains without sensible deflection.

Fig. 8 represents an ingenious contrivance for strengthening the wooden beams supporting a bridge. An iron rod, fixed to the beam AB at the two ends, is kept at a distance by struts, *c*, *c'*. The beam cannot now be bent downward without stretching the rod; which thus has to bear the tensive strain, while the beam itself sustains only the compressive strain.

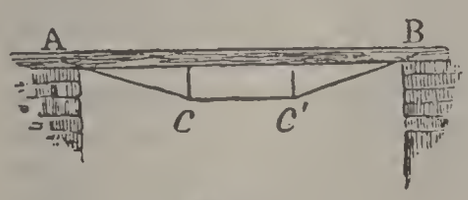


Fig. 8.

Another way of removing part of the strain from a girder is to fix a king-post, *c*, and two oblique pieces on its upper side, as in fig. 9. The whole is now one composite girder; and when any weight, *f*, bears on it, the whole of the compressive strain is thrown on the pieces *a*, *b*, and only the tensive strain is left for the beam to sustain.

Fig. 9.

When a beam AB is fixed at one end and loaded at the other, the strain is greatest at B, and is less at other points, as *c*, *c'*, in proportion as A*c*, A*c'*, the levers at which it acts, are less than AB. The beam may therefore be made to taper off toward the end, and we may determine the exact form that the beam should have in order to be equally strong at every point. For supposing the breadth uniform, the strength increases as the squares of the depths *c'd'*, *cd*, while the strain increases as the levers A*c'*, A*c*; and thus, if $Ac : Ac' :: cd^2 : c'd'^2$, the strengths are equal at those points. This proportion will always hold good if the curve of the beam is that of a parabola; accordingly, this is the shape given to the beams of steam-engines.

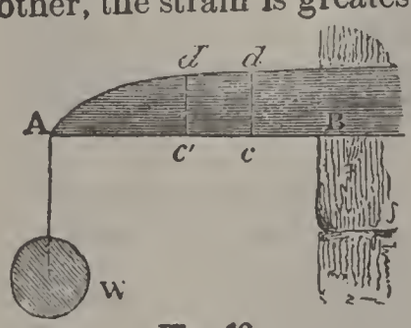


Fig. 10.

In beams supported at both ends, the strain is greatest in the middle; girders are therefore made strongest in the middle, and taper toward the ends.

4. *Shearing Strain.*—This force is called into play when a plate is cut by shears, or when a riveted or bolted joint is torn asunder, in which case the rivets are sheared across. The effect of it is to cause the particles in one plane to slide over those in another; this is resisted by their mutual coherence, and the magnitude of the resistance depends on the number of the particles, that is, on the area of cross-section of the body sheared. The following laws are the result of experiment—1. The ultimate resistance to shearing is proportional to the area of section of the bar sheared. 2. The ultimate resistance of any bar to a shearing strain is nearly the same as the ultimate resistance of the same bar to a direct longitudinal strain.

5. *Torsion.*—If one end of the axle or shaft of a wheel is immovably fixed, and a power acts at the circumference of the wheel (or at the end of a lever or winch), the power may be so increased as to twist the shaft asunder at its weakest point. If a shaft A has twice the diameter of another shaft B, there will be four times as many fibres in the section of fracture of A, to resist the twist, as in that of B. But as the separation takes place by the one end of the fracture turning round on the axis of the shaft, making the ends of the separating fibres describe circles, those fibres furthest from the centre will have greatest power of resistance, and the sum of their moments, or their united effect, will be in proportion to their mean distance from the centre. This mean distance in A is twice that in B; therefore the resistance in A is 2×4, or 8 times the resistance in B. Generally, *the strength of shafts to resist torsion is as the cubes of their diameters.* The torsive strengths of shafts 1 inch diameter, and with weights acting at 1 ft. leverage, being found by experiment for different materials, the strength of shafts of other dimensions is found from these 'constants' by multiplying by the cube of the diameter, and dividing by the length of the lever. It is evident that the torsive strength of a hollow shaft will be greater than that of a solid one of the same quantity of material, on the same principle that its transverse strength is greater. The rule used by Boulton and Watt for calculating the diameters of their wrought iron shafts was as follows:

$$\text{Diameter of shaft in in.} = \sqrt[3]{\frac{120 \times \text{horse-power.}}{\text{Revolu. per minute.}}}$$

This is found to make the shafts rather too light; and the following variation gives safer practical results:

$$\text{Diameter of shaft in in.} = \sqrt[3]{\frac{240 \times \text{horse-power.}}{\text{Revolu per minute}}}$$

STRENUOUS, a. *stren′ū-ŭs* [L. *strenŭus*, active, vigorous—connected with Gr. *strēnēs*, rough, noisy: It. *strenuo*] energetic; vigorous; eager; ardent; active; bold; zealous. STREN′UOUSLY, ad. *-lĭ*, vigorously; actively; with ardor. STREN′UOUSNESS, n. *-nĕs*, the condition or quality of being strenuous; eagerness; activeness; zeal.

STREPITOSO, ad. *strā-pĭ-tō′sō* [It.]: in *mus.*, a direction that the passage to which it is attached is to be played in a noisy, impetuous manner.

STREPSIPTERA, *strĕp-sĭp′tē-ra* [Gr., twisted-wings] order of insects called RHIPIPTERA [Gr., fan-winged] by Latreille, but established first by Kirby. The name S. refers to the fore-wings, which are mere threads; the other term describes the hind-wings. The order S. consists of a small number of species, very remarkable in structure and habits, apparently a connecting link between *Coleoptera* and *Hymenoptera*, and are now classed as coleopters. The species all are small, and, in their larval state, live parasitically in the bodies of bees and wasps. The species form the two genera, *Stylops* and *Xenos*.

STREPT-, STREPTO-: combining forms, derived from Greek *streptos*, twisted (from *strepho*, turn). STREPTOCOCCUS, n. [pl. *-cocci*]: a curved or twisted chain of micrococci.—See BACILLUS: BACTERIA: SCHIZOMYCETES.

STRESS, n. *strĕs* [OF. *estroissir;* F. *étrécir*, to straiten—from L. *stringĕrĕ*, to squeeze, to strain]: force; pressure (see STRENGTH OF MATERIALS): importance; urgency; force either acting or suffered; compulsion: V. in *OE.*, for DISTRESS, to put to hardships.

STRETCH, v. *strĕch* [AS. *streccan;* Dan. *strœkke;* Sw. *sträcka;* Ger. *strecken*, to make tight]: to draw out to greater length or breadth; to bear extension without rupture; to spread; to expand; to strain to a greater space; to strain to the utmost; to carry or extend further than is right; to strain beyond the truth; to be extended: N. extension in length or breadth; effort; utmost extent or reach; course; direction. STRETCH′ING, imp.: N. the act of one who or that which stretches. STRETCHED, pp. *strĕcht:* ADJ. extended; made tense. STRETCH′ER, n. *-ĕr*, one who or that which stretches; a piece of timber to keep other pieces extended; a brick or stone with its longer surface placed lengthwise in the face of a wall; a frame for carrying a person lying flat or slightly raised; a litter; an instr for making boots or gloves somewhat easier. STRETCHING-COURSE, in masonry or brick-work, a course in which the stones or bricks are placed with their longest sides along the face of the wall. The stones are called *stretchers*, as those placed at right angles to them with their end exposed are called *headers*.

STRETTO, *strĕt′tō* [It., bound]: in *music*, a term denoting that the movement to which it is prefixed is to be performed with rapidity gradually accelerating toward the close.—The term *stretto* is applied also to the recurrence in a fugue of the subject in one part before it has come to a close in another: see FUGUE.

STREW, v. *strō* or *strō* [Goth. *straujan;* Dut. *strooijen;* Ger. *streuen;* AS. *streowian;* Icel. *strá;* L. *sternĕrĕ*, to strew]: to scatter; to spread about loosely; same as STROW. STREW'ING, imp.: N. the act of scattering; anything strewn or fit to be strewed. STREWED, pp. *strōd.* STREWMENT, n. *strō'mĕnt*, in *OE.*, anything scattered by way of decoration in honor of.

STRIÆ, n. plu. *strī'ē* [plu. of L. *stria*, a furrow, a channel]: fine thread-like lines or streaks; the fillets between the flutes of columns. STRI'ATE, a. *-āt*, or STRI'ATED, a. *-ā-tĕd*, marked or impressed with thread-like lines; channelled; streaked. STRIATION, n. *strī-ā'shŭn*, state of being streaked or lined: see also STRIGÆ.

Striated Rock.

STRICH, n. *strĭk* [Gr. and L. *strix*, a screech-owl]: in *OE.*, a bird of ill omen.

STRICKEN, a. *strĭk'n* [see STRIKE]: smitten; advanced; far gone.

STRICKLAND, *strĭk'land*, AGNES: English authoress. 1806–1874, July 8; b. at her father's seat, Reydon Hall, near Southwold, Suffolk; third daughter of Thomas S. She was of a literary family. Her first compositions, mostly poetical, were anonymous contributions to periodicals. About 1825 she published, with her sister Susanna (afterward Mrs. Moodie), a volume of *Patriotic Songs;* followed 1826 by a little volume bearing her own name exclusively, and entitled *Worcester Field, or the Cavalier; a Poem, in Four Cantos, with Historical Notes.* This was followed by *The Seven Ages of Woman, and other Poems* (Lond. 1827); and this by *Demetrius, a Tale of Greece, in Three Cantos* (Lond. 1833), in the metre of Byron's *Corsair.* In 1836, she published a little volume, *Floral Sketches, Fables, and other Poems;* repub. 1861. Among her prose works are: *The Rival Crusoes*, without date; *The Pilgrims of Walsingham, or Tales of the Middle Ages, an Historical Romance* 2 vols. (1835); *Tales and Stories from History* (1836); *Alda, the British Captive* (1841); *Historical Tales of Illustrious British Children* (1847; new ed. 1858); *Historic Scenes and Poetic Fancies* (1850); *Old Friends and New Acquaintances* (2 series 1860–1). All these are of small import in comparison with her well-known work, *Lives of the Queens of England, from the Norman Conquest, with Anecdotes of their Courts*, 12 vols. (Lond. 1840–48; new ed., 8 vols., 1851–2). In this work, whose materials she discovered by diligently searching among the treasures of the British Museum and other great public repositories of historic documents, Miss S. was largely assisted by her sister Elizabeth, which she gratefully acknowledges in her Preface. It was dedicated to Queen Victoria; and its picturesque style and anecdotical character made it a general favorite, especially among

that class of readers whose object in reading history is rather amusement than philosophical instruction. Miss Strickland was an enthusiastic upholder of royalty and the English Church, and of the innocence of Mary, Queen of Scots. It is undeniable, however, that in these *Lives* she has added materially to our stock of historical information. Miss Strickland's *Lives of the Queens of England,* concluding with the biography of Queen Anne, have been followed by *Lives of the Queens of Scotland, and English Princesses connected with the Regal Succession of Great Britain,* 8 vols. (Edin. and Lond. 1850-59); and these by *Lives of the Bachelor Kings of England* (Lond. 1861), containing the lives of William Rufus, Edward V., and Edward VI. Miss Strickland published a novel, *How Will It End?* (1865); *Lives of the Seven Bishops* (1866). In 1871 she received a pension of £100.

STRICKLE, n. *strĭk'l* [from STRIKE: Ger. *streich-holz,* a strickle—from *streichen,* to stroke]: an instrument to strike grain to a level with the measure; a strike; a stone for whetting scythes; an instrument used in the molding of pipes.

STRICT, a. *strĭkt* [L. *strictus,* drawn together, bound or tied tight—from *stringo,* I draw tight]: severe; rigorous; exact; governing by exact rules; limited; with rigorous accuracy; confined; accurate; not loose or lax. STRICT'LY, ad. *-lĭ,* exactly; severely. STRICT'NESS, n. *-nĕs,* the condition or quality of being strict; closeness; exactness in the observance of laws, rites, and the like; nice regularity or precision; harshness; severity. STRICTURE, n. *strĭk'tūr* or *-chûr,* a glance; a touch of criticism; a critical remark; censure: in *med.,* a spasmodic or morbid contraction of any passage of the body (see below). STRIC'TURED, a. *-tūrd,* in *surg.,* affected with stricture.—SYN. of 'strict': exact; accurate; rigorous; close; tight; tense; nice.

STRICT OBSER'VANCE: in *chh. hist.,* a subdivision of the Observantine branch of the Franciscan order, founded probably in Spain 1489. In Italy they were known as the Reformed, early in the 16th c. In France they were called Recollects. The Latin holy places at Jerusalem are under the charge of the Franciscans of the Strict Observance.

STRICTURE, in Surgery: unnatural contraction, either congenital or acquired, of a mucous canal, such as the urethra, œsophagus, or intestine. When, however, the affected part is not mentioned, and a person is stated to suffer from stricture, the urethral canal is referred to. Contraction of this canal may be either permanent or transitory; the former is due to a thickening of the walls of the urethra, in consequence of organic deposit, and is hence termed organic stricture; while the latter may be due either to local inflammation or congestion, or to

abnormal muscular action: the first of these transitory varieties may be termed inflammatory or congestive stricture; the second, spasmodic stricture. The spasmodic form seldom exists except as a complication of the other kinds of stricture. There are two principal causes of organic stricture—the first being inflammation of the canal; the second, injury by violence. Inflammation is by far the most frequent cause, and gonorrhea is the usual agent by which it is excited. Frequently, stimulating injections thrown into the urethra to check the gonorrheal discharge excite an inflammatory action which occasions stricture. Stricture from the second cause arises from such causes as falling across spars, scaffolding, ladders, etc., or on some sharp object which punctures the perinæum, e.g., from earthenware vessels which break under the sitter.

The earlier symptoms of stricture are a slight urethral discharge and pain in the canal, behind the seat of the stricture, at the time of micturition. The stream of urine does not pass in its ordinary form, but is flattened or twisted; and as the disease advances it becomes smaller, and ultimately the fluid may be discharged only in drops. The straining efforts to discharge the urine often induce Tenesmus.

As the case advances the urine becomes alkaline and ropy; and deposits a precipitate when allowed to stand; and attacks of complete retention occur with increasing frequency. But these symptoms are not in themselves sufficient to establish the presence of stricture. It is necessary to examine the urethral canal with a catheter or sound to ascertain whether an organic obstruction exists, whether one or more strictures are present (as many as eight have been recorded, though rarely are there more than four, and one is the most common number, and their caliber. The treatment of organic stricture is too purely surgical to be presented here; its object is twofold: first, to restore the natural caliber of the canal, so far as this can be safely effected; secondly, to maintain this patency, after it has been established.

Spasmodic stricture may occur from any of the following causes: from organic stricture, or from inflammation of the mucous membrane; from acrid condition of the urine; from administration of cantharides, turpentine, etc.; and from voluntary retention of urine for too long a time. The treatment consists in the removal of the causes as far as possible, and the hot bath. The inhalation of chloroform sometimes gives immediate relief; and several cases are recorded in which, when the spasm occurred periodically, it was cured by quinine. In inflammatory or congestive stricture the patient complains of heat, fulness, and soreness in the perinæum; the passage of the urine is extremely painful, the stream being small, and ceasing before the bladder empties. The treatment is much the same as that for retention of urine.

STRIDE, n. *strīd* [Icel. and Sw. *strida;* Dan. *stride,* to contend, to struggle with: Low Ger. *striden,* to contend, to stride: AS. *stræde,* a stride]: a long step: V. to walk with long steps; to stand with the legs far apart; to pass over at a step. STRI'DING, imp. STRODE, pt. *strōd,* or STRID, pt. *strĭd.* STRIDDEN, pp. *strĭd'n.*

STRIDENT, a. *strī'dĕnt* [L. *strīdens* or *strīden'tem,* making a harsh creaking sound; *strīdērĕ,* to creak]: characterized by harsh grating sounds, as speech; grating. STRI'DOR, n. *-dŏr* [L.]: a harsh grating sound.

STRIDULOUS, a. *strĭd'ū-lŭs* [L. *stridŭlus,* creaking —from *strīdērĕ,* to creak: It. *stridulo*]: making a small harsh noise; squeaky; hissing; creaking. STRIDULATE, v. *strĭd'ū-lāt,* to make a small, harsh, or creaking noise. STRID'ULATING, imp. STRID'ULATED, pp. STRID'ULA'TION, n. *-ū-lā'shŭn,* the act of making a small, harsh, creaking noise; the noise itself.

STRIFE, n. *strīf* [OF. *estrif,* contention: Icel. *strid,* contention: Ger. *streben,* to strive, to make efforts: Low Ger. *streven,* to exert force]: contention for superiority; discord; contention in anger or enmity; conflict; quarrel; war. STRIFE'FUL, a. *-fûl,* contentious; discordant. —SYN. of 'strife': contention; contest; struggle.

STRIGÆ, n. plu. *strī'jē* [plu. of L. *striga,* a row or ridge in plowing]: in *arch.,* the flutings of a column; in *bot.,* little, upright, unequal, stiff hairs swelled at their bases. STRI'GOSE, a. *-gōs,* covered with strigæ or sharp rigid hairs.

STRIGIDÆ, *strĭj'ĭ-dē:* family of nocturnal birds of prey. See OWL.

STRIGIL, n. *strĭj'ĭl* [L. *strigilis,* a strigil—from *stringo,* I draw tight, I tie tight]: in *class. antiq.,* an instrument of metal, ivory, or horn, used by the ancients for scraping the skin at the bath; a flesh-brush.

STRIKE, v. *strīk* [Dut. *strijken,* to rub, to strike: Dan. *stryge;* Sw. *stryka,* to wipe, strike: Ger. *streich;* Dut. *streke;* Icel. *strik,* a stroke, a blow]: to give a blow

to; to hit with some force; to make an attack; to act on in any way, as by a blow; to penetrate, as a tree's roots; to throw by a quick motion; to dash or be dashed; to touch ground; to run upon, as a ship; to act on by beating against; to notify by sound; to sound, as a bell; to produce by blow or friction, as fire; to cause to sound by blows; to coin or mint; to lower or take down, as a sail or flag; to ratify, as a bargain; to alarm; to surprise; to impress, as by a speech; to affect suddenly in any particular manner: in *Amer.*, to light upon, as to *strike* oil; to refrain from work in a body, as workmen for redress of some grievance, or for increase of wages (see TRADE-UNION; LABOR; BOYCOTT): to level, as a measure; in *OE.*, to punish; to afflict: N. in *OE.*, a measure; a flat piece of wood for levelling grain heaped in the measure; a cessation from work for higher wages, or on account of some grievance, by workmen; in *geol.*, direction or line of outcrop of any stratum—the line which it makes when it appears on the surface of the earth, this line being always at right angles to the dip of the bed. The angle of dip and the direction of strike are determined by a clinometer and compass. A perfectly horizontal stratum can have neither dip nor strike. STRI'KING, imp.: ADJ. affecting; surprising; impressive; exact. STRUCK, pt. pp. *strŭk*, hit with some force. STRICKEN, old pp. *strĭk'n*, afflicted; far gone. STRIKER, n. *strī'kĕr*, one who strikes; a seaman's name for a harpoon; in *Scrip.*, a quarrelsome man. STRI'KINGLY, ad. *-lĭ*. TO STRIKE A BALANCE, to adjust an account to show whether the Dr. or Cr. side is the larger. TO STRIKE A JURY, to constitute a jury by each party striking out a certain number of names from a prepared list. TO STRIKE A LEDGER OR AN ACCOUNT, to balance it. TO STRIKE FOR, to start suddenly on a course for. TO STRIKE HANDS WITH, to make a compact or agreement by gripping or shaking hands. TO STRIKE IN, to join or enter suddenly. TO STRIKE IN WITH, to conform; to suit itself to. TO STRIKE OFF, to separate by a blow; to erase; to deduct; to print. TO STRIKE OUT, to blot out; to efface; to devise; to form by a sudden effort, as a design; to wander. TO STRIKE SAIL, to take in sail; to cease to advance; to make no further progress. TO STRIKE UP, to begin to sing or play. TO STRIKE THE FLAG, to lower the flag. TO STRIKE WORK, to cease from working (see STRIKE; UNION; ETC.). TO STRIKE UNDER, to submit. STRICKEN IN YEARS, being of an advanced age.—SYN. of 'strike, v.': to dash; stamp; impress; contract; lower; produce; effect; forge; mint.

STRIKE, LABOR: a concerted movement on the part of workingmen to compel their employers to grant some demand, such as higher wages, shorter hours, or the dismissal of a wage-earner who does not belong to the union. Occasionally it is for the purpose of supporting a strike in some other establishment, which may belong to a different department of labor, in which case it is

called a sympathetic S. The earliest known S. on record in the United States was by journeymen bakers in 1741. The first railroad strike, which was in 1877, and against a reduction in wages, failed, after $5,000,000 worth of property had been destroyed. In 1892 six strikes occurred, including that at Homestead, Pa., which required 8,000 troops to quell it. In 1894 a strike for higher wages of the 3,000 employees of the Pullman Car Co., at Chicago, was sympathetically supported by the American Railway Union of over 100,000 men. Rioting occurred with such destruction of property that President Cleveland was obliged to call out Federal troops to restore order. The loss to the railroads was $5,700,000; to the strikers in wages, $2,000,000. The S. was a failure. In the same year more than 150,000 mine workers in the United States struck against a reduction in wages, but lost $13,500,000 in wages and were only partly successful. In 1902, May 15-Oct. 23, a strike of the anthracite coal miners in Pennsylvania occurred. The demands were for a 20 per cent. increase in wages; an 8-hour workday for men paid by the day; the reduction of the size of a ton of mined coal, and the recognition of the miners' organization by the employers in considering mutual relations. Lawlessness in some districts led to the calling out of militia, and on Oct. 4 of all the militia. Meanwhile, the shortage in the coal supply, and high prices, caused actual suffering. Pres. Roosevelt brought about a cessation of the strike, operators and miners having agreed to submit the questions at issue to a commission appointed by him and to abide by its decision. The award of this commission made public 1903, March 21, secured for the miners a sliding wage scale, shorter hours, local boards of arbitration for settlement of disputes in individual collieries, and some other concessions. The operators were justified in refusing certain demands, and the right of non-union men to work without discrimination was established. The cost of this strike was estimated at over $142,000,000, including loss to strikers in wages of $29,700,000, to operators in price of coal of $55,100,000. In 1902, also, 70,000 coal miners in France struck, but were only partly successful. In 1881-1900 there were 22,793 strikes in the U. S., involving 117,500 establishments and more than 6,100,000 men, with loss in wages of $257,800,000. Of these strikes 50.77 per cent. were wholly successful. In Gt. Britain there were 3,164 strikes in 1889, and 1,028 in 1900. In United Kingdom 1897-1901 there were 3,584 strikes and lockouts, involving 1,032,475 employes.

STRING, n. *string* [AS. *strenge;* Icel. *strengr;* Ger. *strang*, a cord, a string—from STRONG, which see]: a line or cord; a tape or ribbon used in fastening; twine; the cord of a musical instr.; a small fibre; a nerve; a tendon; a set or line of things; the thread on which they are strung; a series: V. to furnish with strings; to put upon a string; to make tense. STRING'ING, imp.: N. strings collectively.

STRUNG, pt. or pp. *strŭng.* STRINGED, a. *strĭngd,* furnished with strings; produced by strings. STRINGY, a. *strĭng'ĭ,* consisting of small threads; fibrous; ropy; viscid. STRING'INESS, n. *-nĕs,* state of being stringy. STRING'LESS, a. *-lĕs,* having no strings. STRING'ER, n. *-ĕr,* one who strings. STRING-BOARD, a board which faces the well-hole of a staircase and receives the ends of the steps. STRING-COURSE, thin projecting course of stone or brick-work in a wall; generally ornamented with a molding, and made to go round windows, etc. STRINGHALT, or SPRINGHALT, among *horses,* etc., lameness arising from some defects in the muscles of the hock; a sudden twitching or peculiar catching up of the horse's limbs, usually of one or both hind limbs: it is most noticeable when the animal is first brought out of the stable, when he is excited, or made to turn suddenly round. It is a variety of chorea or St. Vitus's dance. Although a serious eyesore, it does not interfere with usefulness, and is quite incurable. TO HAVE TWO STRINGS TO THE BOW, to have two methods, expedients, or professions; to have a double advantage or a twofold security. HARPING ON ONE STRING, talking on one subject, or repeating the same thing.

STRINGENDO, *strĭn-jĕn'dō:* term in music denoting gradual acceleration in time.

STRINGENT, a. *strĭn'jĕnt* [L. *stringens* or *stringen'tem,* drawing tight—from *stringĕrĕ,* to draw tight]: binding strongly; severe; rigid. STRIN'GENTLY, ad. *-lĭ.* STRIN'GENCY, n. *-jĕn-sĭ,* the act of binding strongly; strictness; severe pressure.

STRINGHAM, *strĭng'am,* SILAS HORTON: naval officer: 1798, Nov. 7—1876, Feb. 7; b. Middletown, N. Y. When 11 years of age he became a midshipman in the navy; served on the *President* in the war of 1812, and on the *Spark* in the Algerine war; was on the African coast 1819–21, and captured several slave ships, and during the next three years was active and efficient in suppressing pirates in the vicinity of the W. Indies. After being in command of the navy-yard at New York, serving in the Mexican war, and successively in charge of the navy-yards at Norfolk and Boston, he became flag-officer of the Mediterranean squadron 1853. At the opening of the civil war he commanded the blockading fleet in the n. Atlantic, but soon retired, on account of age, with the rank of commodore. He was in charge of the navy-yard at Boston 1862–65, and was afterward port-admiral at New York. He became rear-admiral on the retired list 1862, July 16. He died at Brooklyn.

STRIP, v. *strĭp* [Low Ger. *stripe;* Dut. *streep;* Ger. *streif,* a strip or long narrow portion]: to pull or tear off; to make bare or naked by depriving of a covering; to undress; to expose; to make destitute; to plunder; to divest; to bereave; to reduce to strips; in *OE.,* to cast off: N. a narrow slip, such as is stripped off at a blow; a shred STRIP'PING, imp. STRIPPED, pp. *strĭpt.* STRIP'PER, n. *-pĕr,* one who strips.

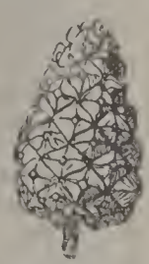
STRIPE, n. *strīp* [from STRIP, which see]: a long narrow slip of anything attached to something of a different color; a long narrow line or mark of a different shade or color; a discoloration or wale made with a lash or whip: the stroke which causes it: PLU. in *Scrip.*, punishment; affliction: V. to form or variegate with stripes; to form with lines of different colors; to beat. STRI'PING, imp. STRIPED, pp. *strīpt.*

STRIPLING, n. *strĭp'lĭng* [from STRIP, which see: comp. Norw. *strik*, a streak, a tall thin youth]: one strip-shaped; a tall slim youth; a young person; a lad.

STRIVE, v. *strīv* [from STRIFE, which see: OF. *estrif*, contention: Icel. *strida*, to contend: Low Ger. *streven*, to exert force]: to endeavor earnestly; to labor hard; to struggle in opposition to another; to contend in emulation. STRI'VING, imp.: N. a contest. STROVE, pt. *strōv.* STRIVEN, pp. *strĭv'n.* STRIVER, n. *strī'vĕr*, one who strives.—SYN. of 'strive': to contend; vie; struggle; endeavor; emulate; aim; contest.

STROBI'LA: see TAPEWORM.

STROBILE, n. *strŏb'ĭl*, or STROBILUS, n. *strō-bī'lŭs* [Gr. *strobīlŏs*, anything twisted up, a pine-cone—from *strobos*, a turning round—from *strephō*, I turn]: in *bot.*, a multiple fruit in the form of a cone, as that of the hop or pine. STROBILIFORM, a. *strō-bī'lĭ-fawrm* [L. *forma*, shape]: shaped like a strobile. STROBILITES, n. plu. *strō-bī'līts* [Gr. *lithos*, a stone]: in *geol.*, cones occurring in the coal and other formations.


Strobile.

Section of Strobile.

STROCAL, n. *strō'kăl*, or STROCKLE, n. *strō'kl:* among *glassmakers*, a tool like a shovel for emptying the chests of metal into the pots.

STRODE, v. *strōd:* see STRIDE.

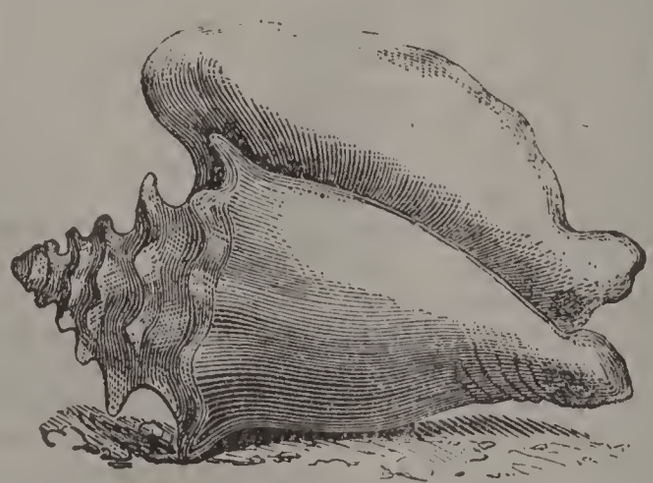
STROKE, n. *strōk* [from STRIKE, which see: Gael. *strac*, a loud or crashing noise: Ger. *streich;* Dut. *streke*, a blow]: a blow; any sudden or fatal attack, as of disease—particularly, an attack of paralysis; the sound of the clock; a touch; a dash; a masterly effort; the touch of a pencil; the sweep of an oar; the upward and downward motion of the piston of a steam-engine. STROKE, n. a contr. for STROKE-OAR or STROKESMAN, in *rowing*, the man whose stroke leads the rest. STROKE OF GRACE, the finishing-stroke that ends the life of a criminal executed by breaking on the wheel; in the judicial combats of mediæval times, the stab given to put an end to the life of the vanquished.

STROKE, v. *strōk* [Ger. *streichen*, to graze or touch lightly: Low Ger. *straken*, to stroke]: to rub gently in one direction; to graze or touch lightly; to soothe; to smooth. STRO'KING, imp.: N. the act of rubbing gently with the hand. STROKED, pp. *strōkt.* STRO'KER, n. *-kĕr*, one who rubs gently. STRO'KINGS, n. plu. the last milk that can be drawn from the udder of a cow.

STROLL, v. *strōl* [Swiss, *strolen*, to rove about: prov. Dan. *strelle*, to stroll: Ger. *straucheln;* Dut. *struikelen*, to stumble]: to walk idly and leisurely; to ramble or wander on foot: N. a walk taken leisurely; a ramble. STROL'LING, imp.: ADJ. vagrant; itinerant, as a *strolling* player. STROLLED, pp. *strōld.* STROL'LER, n. *-lĕr*, one who strolls, a vagabond; an itinerant player.—SYN. of 'stroll, v': to rove; roam; stray; wander; range.

STROMA, n. *strō'mă* [Gr. *strōma*, anything spread out for resting, a bed—from *strōnnumi*, I spread out]: in *anat* anything spread or laid out for resting upon; the tissue which affords mechanical support; in *bot.*, a cellular swelling at the point where a leaflet joins the midrib. STRO'MATOL'OGY, n. *-tŏl'ŏ-jĭ* [Gr. *logos*, discourse]: the history of the formation of the stratified rocks.

STROMATEUS, *strō-măt'ē-ŭs:* genus of fish, giving name to the family *Stromateidæ*, which is not large, and is widely distributed in the warm seas.—The Butter-fish (*S. triacanthus*), very different from the Butter-fish of England (see GUNNEL), is known as Dollar-fish in Me.; Sheepshead (not the true fish of that name) at Cape Cod, Pumpkin seed in Conn., Star-fish in Va. It attains 7–8 in., about $2\frac{1}{2}$ times its vertical measure, and is esteemed as food in most places. Freshly caught, the iridescent colors are brilliant; in alcohol, silvery. The young have the curious habit of sheltering themselves under jelly-fish. The Harvest-fish (*S. alepidotus*), N. Y. to Brazil, is called confusingly the Whiting at Norfolk, Va., where it is eaten: it attains 6 in. in length, and 4 in. height. The California Pompano (*S. simillimus*) of Or. also reaches a length of 8 in; the flesh is fat, rich and excellent.—The Black Rudder-fish (*Lirus perciformis*), a stromateid, N. J. to Nova Scotia, 10–12 in., is called Log-fish and Barrel-fish, from its habit of gathering under floating logs, and barrels, etc., and is excellent food.



Fountain-shell (*Strombus gigas*).

STROMBIDÆ, *strŏm'bĭ-dē:* family of gasteropodous mollusks, of order *Pectinibranchiata*, nearly allied to *Buccinidæ* (Whelks, etc.) and *Muricidæ*. The shell has a canal, the external lip of which, as it attains maturity, be-

comes more or less dilated, and is marked with a sinus, whence the head issues when the animal comes out. The foot is narrow and small, but is employed in active leaping movements, during which the shell oscillates from side to side. The species are numerous, mostly inhabitants of tropical seas. Some are among the largest of mollusks. *Strombus gigas* is found in the W. Indies, on reefs in shallow water, and is fished both for the table and on account of the shell. Great numbers of the shells are exported; 300,000 having been sent to Liverpool in a year. They are sometimes called Fountain-shell, from occasional use as a garden ornament. Their chief use is by cameo-makers, by whom they are valued for their solid and delicately tinted substance. A shell sometimes weighs four or five lbs. Pearls of delicate pink color are sometimes found in this shell. The *Strombi* are sometimes called wing-shells, from the dilated margin of the lip.

STROMBOLI, *strŏm'bō-lē:* one of the group of the Lipari Islands (q.v.), the most n.-easterly of the group. It is about 12 m. in circumference, circular in shape, wholly of volcanic formation, and rises 3,100 ft. above sea-level. On its w. side is a volcano of considerable activity. Sulphur and pumice-stone are gathered in large quantities; and among the chief agricultural products are cotton, wine, and excellent fruits.—Pop. of island about 2,000.

STROMBULIFORM, a. *strŏm-bū'lĭ-fawrm* [L. *strombus*, a spiral shell; *forma*, shape]: in *geol.*, formed like a top; in *bot.*, twisted with a long spire.

STROMNESS': see ORKNEY ISLANDS.

STROMNITE, n. *strŏm'nīt* [from *Stromness*, in Orkney]: carbonate of strontian, a mineral occurring in yellowish-white or semi-transparent masses.

STRONG, a. *strŏng* [AS. *strang;* Icel. *strangr;* Dan. *streng;* Sw. *sträng;* Dut. *streng*, rough, rigid, strong] having great strength or ability of body; having moral, intellectual, or material force; vigorous; healthy; muscular; robust; having the power of exerting great force; forcible; having passive power; adapted to make a deep impression on the mind or on the senses; affecting strongly; having a particular quality in a great degree; intoxicating; ardent; zealous; compact; solid; not easily overthrown or altered; fortified; denoting military strength or number, as a thousand *strong*. STRONG'LY, ad. *-lĭ*, powerfully; forcibly; in such a manner as not easily to be forced; in such a manner as to last. STRONG-BOX, a chest or safe for valuables. STRONG-MINDED, a. having a vigorous or determined mind. STRONG-SET, a. compacted or firmly set. STRONGHAND, force; violence; power. STRONGHOLD, a fortress; any place of refuge or strength.—SYN. of 'strong': vigorous; powerful; mighty; violent; impetuous; hale; positive, full; potent; rancid; valid; confirmed; violent; vehement; cogent; conclusive; able; skilful; firm; stout; muscular energetic.

STRONG, George Crockett: soldier: 1832, Oct. 16—1863, July 30; b. Stockbridge, Vt. He graduated from West Point 1857; was at the Watervliet arsenal as assistant 1859–61, and for a short time as commander; was staff-officer to Gen. McDowell and to Gen. McClellan, and chief of staff to Gen. Butler, was in the battle of Bull Run, aided in organizing the New Orleans expedition, and rendered valuable service in Miss. and La., and in operations against Charleston 1863. While leading an assault on Fort Wagner, he received a wound, from the effects of which he died 12 days later, in New York. He was promoted brig.gen. vols. 1862, and capt. of ordnance 1863, Mar. 3. He published *Cadet Life at West Point* (1862).

STRONG, George Templeton: lawyer: 1820, Feb. 26—1875, July 21; b. New York. Graduating at Columbia Coll. 1838, he became an eminent lawyer in New York. He was treasurer of the U. S. sanitary commission during the civil war. His library was one of the best in New York.

STRONG, James, s.t.d., ll.d.: Methodist Episc. lay scholar: 1822, Aug. 14–1894, Aug. 7 b. New York. He graduated at Wesleyan Univ. 1844; was teacher of Greek and Latin in the acad. at West Poultney, Vt., 1844–46; prof. of biblical lit. and acting pres. of Troy Univ. 1858–61; and prof. of exegetical theol. in Drew Theol. Seminary, N. J., since 1868. At intervals, from ill health, he has pursued farm life; also has lived in Flushing, L. I., and been pres. of its railroad, which he originated. He was a member of the O. Test. revision committee. Besides Greek and Hebrew manuals and a Chaldee grammar, he has published *Harmony and Exposition of the Gospels* (1852); a Harmony of the same in Greek (1854); *Scripture Hist.*, derived from all sources (1878); *Irenics*, showing agreement of science and the Bible (1883); the valuable *Cyc. of Biblical, Theological, and Ecclesiastical Literature*, 10 vols. (1867–81)—the first 3 vols. in co-operation with Prof. McClintock; *The Tabernacle of Israel in the Desert* (1888); his last work (1894) was an exhaustive and complete manifold Concordance of the Bible, with many new and very valuable features, such as giving the various Greek words (in English characters) in connection with the words of the English version, with a Greek concordance (all Greek words in the Bible in English characters): this Concordance, is recognized as an aid of unparalleled value in biblical study. He edited *Daniel* and *Esther* in Lange's commentary as translated; and was one of the pioneers in the present system of Sunday-school lessons.

STRONG, James Hooker: naval officer: 1814, Apr. 26—1882, Nov. 23; b. Canandaigua, N. Y. Appointed midshipman 1829, he did not enter the naval service till the completion of his studies at the Chittenango Polytechnic Coll. 1833. He served on the Brazil station in the sloop *Lexington* 1833–35, and distinguished himself in a fight with pirates on one of the Falkland Islands. Promoted passed midshipman 1836, lieut. 1841, and commander

1861, he did duty in the blockage of the s. Atlantic coast 1861–2, and of the w. Gulf coast 1863–65: in the battle of Mobile Bay, he was the first to ram the Confederate iron-clad *Tennessee*. He was advanced to the captaincy 1865; became commodore 1870, rear-admiral 1873; commanded the s. Atlantic squadron 1873–75; and was placed on the retired list 1876, Apr. 25.

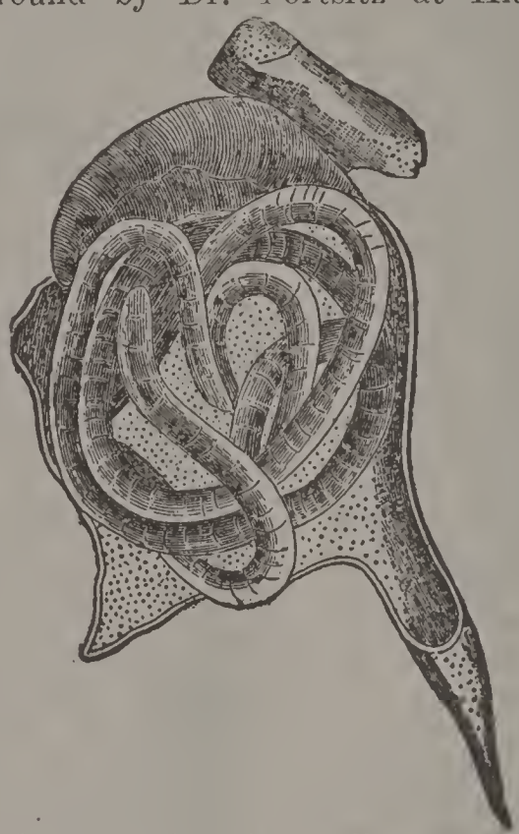
STRONG, NATHAN, D.D.: Congregational minister: 1748–1816, Dec. 25; b. Coventry, Conn.; son of the Rev. Nathan S. He graduated at Yale 1769, where he was tutor two years; studied law, and subsequently theol., and was pastor of the First Church in Hartford, Conn., 1774 until his death, for a time acting as army chaplain in the revolution. He was eminent for learning and pulpit ability. He published *The Doctrine of Eternal Misery Consistent with the Infinite Benevolence of God* (1796), and two vols. of sermons on religious revivals (1798–1800).

STRONG, THEODORE, LL.D.: 1791, July 26—1869, Feb. 1; b. South Hadley, Mass.: mathematician. After graduation at Yale 1812, he was tutor and prof. of math. and nat. philos. in Hamilton Coll. until 1827, and of the same in Rutgers Coll. until 1861, having been vice-pres. of the coll. 24 years, and becoming prof. emeritus. He was unexcelled among his contemporaries in abstract math., having solved problems attempted in vain by others, and led the way in extracting any root of an integral number by direct method. One of the corporate members of the National Acad. of Sciences, he read many papers before that body; e.g., on the *Parallelogram of Forces and on Virtual Velocities* (1864); *Integration of Differential Equations of the First Order and Higher Degrees* (1864); *New Theory of the Differential Calculus* (1865); *New Theory of Planetary Motion* (1866), etc. He published a treatise on *Elementary and Higher Algebra* (1859), and on *Differential and Integral Calculus* (1869).

STRONG, WILLIAM, LL.D.: 1808, May 6–1895, Aug. 19. b. Sommers, Conn.: graduated from Yale 1828, studied law, and began practice at Reading, Penn., 1832. He was a member of congress 1847–51, and declined another nomination; was justice of the Penn. supreme court 1857–68; resigned in the latter year and began law practice in Philadelphia; was appointed by Pres. Grant a justice of the U. S. supreme court 1870, and resigned 1880. For several years he lectured on law at the Columbian University; he was one of the members of the electoral commission 1877. He was prominently identified with the interests of the Presb. Church.

STRONG, WILLIAM L.: merchant: 1827–1900, Nov. 2; b. Richland co., O. Early in life he engaged in the dry-goods business; removed to New York 1853, where he became prominent in that business and acquired wealth. He has been pres. of the Business Men's Republican Club, of the Central National Bank, of the Homer Lee Bank-Note Co., and of other organizations. In 1894 he was elected mayor of New York on the anti Tammany reform ticket resulting from the Lexow investigation.

STRONGYLE, n. *strŏn'jĭl,* or STRONGYLUS, n. *strŏn'-jĭl-ŭs,* STRONGYLI, n. plu. *strŏn'jĭl-ī* [Gr. *strŏnggŭlos,* round, globular]: genus of family *Strongylidæ* (q.v.) of nematode parasitic worms. Infesting man, is the *S. bronchialis* of Cobbold, previously known as *Filaria hominis bronchialis, Hamularia compressa,* etc. The male usually is rather more than half an inch long, while the female is more than an inch. The worm was discovered by Treutter 1790, who found several individuals in the bronchial glands of an emaciated subject. In 1845 it was again found by Dr. Fortsitz at Klausenberg in



Strongylus or Eustrongylus gigas.—From Cobbold's *Entozoa.*

Transylvania, in the lungs of a boy six years old. These are the only two cases recorded by Küchenmeister and Cobbold of its occurring in the human subject; but closely allied species, *S. paradoxus* and *S. micrurus,* are occasionally found, according to Cobbold, in the lungs and air-passages of the pig and the calf respectively, and Küchenmeister states that he has found a species in the lungs of the sheep. A species of Strongyle has been found in the human intestine. A worm of the same family, the *Syngamus trachealis,* causes the gapes in fowls.

Closely allied to Strongyle is the genus *Eustrongylus* of Diesing and Cobbold, which contains the species *E. gigas.* This is the largest nematode worm at present known to infest man or any other animal, the male measuring 10 to 12 inches in length, and one-fourth of an inch in breadth, while the female is said to attain a length of over three feet, its transverse diameter being fully half an inch; body cylindrical, and more or less tinged with redness; head obtuse, and furnished with a

simple oval aperture surrounded by six chitinous nodules; mode of reproduction, probably viviparous; eggs broadly oval, measuring about $\frac{1}{300}''$ from pole to pole. This worm occurs, according to Bremser, in the kidneys and bladder, sometimes in the abdominal cavity and the omentum, more rarely in the lungs and liver of 'martens, dogs, wolves, seals, otters, oxen, and horses.' Fortunately, it is very rare in man, and, according to Cobbold, weasels are the animals in which it is most commonly found. The accompanying figure shows one of these worms coiled up within the pelvic cavity of the kidney of one of the Strongyle American coati, belonging to the *Procyonidæ.* The symptoms to which it must give rise must be much the same as those arising from abscess and degeneration of one of the kidneys, or from renal calculi. The diagnosis in a suspected case could be established only by detection of the eggs or embryos in the urine.—The term strongyle is applied also to sponge spicules of certain patterns.

STRONGYLIDÆ, *strŏn-jĭl'ĭ-dē:* family of nematode worms, possessing the following common characters: The body is round, sometimes very much elongated, and almost thread-like. The mouth is round, oval, or triangular, and at the extreme anterior end of the body. The tail of the male is commonly furnished with a bursa, usually emitting two spicules. The whole family is parasitic, and contains a number of genera. Some of the Strongylidæ are parasitic in man, some in mammals, birds, reptiles, etc.

STRONTIA, n. *strŏn'shĭ-ă,* or STRON'TIAN, n. *-ăn* [from *Strontian,* in Argyleshire, Scotland]: one of the alkaline earths, a grayish-white powder having an acid, burning taste (for its metallic base, see STRONTIUM): the *nitrate of strontia* is used in the form of powder in fireworks to give red color to flame. STRON'TIAN, a., or STRONTIT'IC, a. *-tĭt'ĭk,* of or pertaining to strontia. STRONTIANITE, n. *strŏn'shĭ-ăn-īt,* carbonate of strontia, a mineral of an apple-green or yellowish-brown color, occurring in variously modified hexahedral prisms and in fibrous granular masses.

STRONTIUM, *strŏn'shĭ-ŭm* (symb. Sr, at. wt. 175., sp. gr. 2.5): ductile and malleable metal, somewhat harder than lead, and of pale yellow color. It melts at red heat, and is more electronegative than calcium or the alkali-metals. When heated in the air, it burns with crimson flame, and becomes converted into its oxide, strontia. It is unaffected by the action of dry air, but it decomposes water at an ordinary temperature, hydrogen being explosively developed; and it burns in chlorine gas, and in the vapor of iodine, bromine, and sulphur. It dissolves in dilute nitric acid, but the strong acid has scarcely any effect on it. Strontium does not occur in the native state, but exists as a carbonate in the mineral *Strontianite;* as a sulphate in the mineral known as

Celestin; and in small quantity, as chloride or sulphate, in many brine-springs and mineral waters, in sea-water, and in the ash of bladder-wrack. It is obtained by electrolysis of chloride of strontium. Strontium bears to barium the same close relation that sodium bears to potassium; and the compounds of strontium resemble those of barium in composition and properties.

Strontium monoxide, commonly known as STRONTIA, is obtained in the same way, and resembles in almost all respects the corresponding oxide of barium, except that it is inert when taken into the system, while baryta is poisonous. When a small quantity of water is poured on it, it slakes, giving out heat: the result is strontium hydroxide, $Sr(OH)_2$, which dissolves readily in hot water, and separates on cooling as a hydrate, $Sr(OH)_2.8H_2O$, soluble in 50 parts of cold and 2.4 parts of boiling water. The dioxide, SrO_2, is prepared by action of hydrogen dioxide on strontia-water.

The salts of strontium resemble those of barium in their general characters, and in their being precipitated from their solutions by sulphuric acid and the soluble sulphates; but they differ from them in not being thrown down by silico-fluoric acid or hyposulphite of soda, and in their communicating to the flame of the spirit-lamp and to burning substances generally, a brilliant purple-red color. *S. Carbonate,* $SrCO_3$, occurs native both massive and crystalline, and may be obtained artificially as a white powder by precipitating a soluble salt of strontium with carbonate of soda. *S. Sulphate,* $SrSO_4$, occurs native in *Celestin,* a mineral found in rhombic prisms and fibrous masses in Sicily. *S. Nitrate,* $Sr(NO_3)_2$, separates from a hot concentrated solution in large colorless transparent anhydrous octahedral crystals, which dissolve freely in water. By addition of nitric acid, it is precipitated from its aqueous solution. Its chief use is in pyrotechny. A mixture of 800 grains of nitrate, 225 of sulphur, 200 of potassium chlorate, and 50 of lampblack, deflagrates with magnificent red color, and constitutes what is popularly known as *Red Bengal Fire;* but the mixture is dangerous both to prepare and to preserve, having occasioned frightful accidents to the manufacturers from spontaneous ignition.

The most important of the haloid salts of strontium is the *Chloride,* $SrCl_2$, which may be obtained in crystals containing six equivalents of water. The water is expelled at moderate heat, leaving the chloride anhydrous. The chloride is the only salt from which the metal has been obtained.

Strontia was discovered as an independent substance almost simultaneously by Hope and by Klaproth 1793. In 1807 Davy obtained barium and strontium from their oxides, but not pure; and 1855 Bunsen and Matthiessen succeeded in procuring perfectly pure specimens of the metal.

STROP, n. *strŏp* [same as STRAP, which see: Sw. *stropp*, a strap: It. *stroppa*, an osier to bind fagots: L. *struppus*, a thong]: a strip of leather, or flat prepared substance, on which razors are sharpened: V. to sharpen on a strop. STROP'PING, imp. STROPPED, pp. *strŏpt*.

STROPHAN'THUS: a genus of trees, shrubs or climbers, belonging to the *Apocynaceæ*, and found in Asia and Africa, being chiefly tropical. The leaves are feather veined and opposite, and the cymose inflorescence is terminal. The flowers are handsome, ranging in color from white, through the yellows and reds, to purple. The calyces are glandular, the corollas funnel-shaped, with five lobes tapering into attenuated, long tails. The two carpeled ovaries develop into capsular fruits having two diverging free follicles, which enclose the hairy seeds. A climbing species (*S. hispidus*) has seeds which are hairy and have a plumose tuft of silky hairs attached to their apexes, by a slender filament and which contain a bitter, poisonous glucoside called strophanthin. This poison contracts the voluntary muscles, and is so deadly that an elephant wounded by the spiked and strophanthus-poisoned beams, which are hung for the purpose in the runs of the huge beasts, is unable, it has been stated, to go more than ten miles from the spot. Species of strophanthus, especially *S. hispidus*, are powerful ingredients of those African arrow-poisons called in West Africa inée, onaye or poison of Pahonias, and in East Africa, Kombé; while still another near Somaliland is known as wanika poison. Strophanthin is a valuable cardiac stimulant, and a drug employed in heart disease, similar in its effects to digitalis, slowing the heart's action, and increasing its contractility and the tension of the arteries, but is more rapid and uncertain in its effects than the other drug. Several species are known in gardens and greenhouses, one, *S. petersianus*, being remarkable for its octopus-like twisted corolla lobes, colored red and yellow.

STROPHE, n. *strō'fē* [Gr. *strophē*, a turning—from *strephō*, I turn: It. *strofa;* F. *strophe*]: in the *Greek drama*, that part of a song or dance which was performed in *turning* from the right to the left of the orchestra; the first of two stanzas. STROPH'IC, a. *-ĭk*, pertaining to strophes.

STROPHIOLE, n. *strŏf'ĭ-ōl* [L. *strophiŏlum*, a little garland or chaplet—from *strophĭum*, a band or wreath—from Gr. *strephō*, I twist]: in *bot.*, a swollen fungus-like excrescence on the surface of some seeds about the hilum. STROPH'IOLATE, a. *-ō-lāt*, furnished with a garland, or its resemblance; in *bot.*, having little fungus-like excrescences around the hilum.

STROPHULUS, n. *strŏf'ū-lŭs* [mid. L. *strophulus*—from Gr. *strophos*, a twisted band or cord—from *strephō*, I turn]: in *med.*, red gum, an eruption of reddish (sometimes whitish) pimples on the face, neck, and upper

extremities, occurring in infants. It is caused by reflex irritation of the skin from teething, intestinal disturbance, etc.

STROTHER, *strŏth'ėr,* DAVID HUNTER: writer and designer: 1816, Sept. 16—1888, Mar. 8; b. Martinsburg, Va. (now in W. Va.). Having studied drawing under Samuel F. B. Morse in New York, he spent 5 years in travel in Europe 1840-45. Returning to New York, he became a designer on wood, and 1848 retired to his native place. Thence he contributed to *Harper's Magazine* a series of papers illustrated with his own original designs, and signed 'Porte-Crayon': many of these papers were afterward reprinted in the two vols., *Blackwater Chronicle* (1853) and *Virginia Illustrated* (1857). During the civil war Strother served in the Federal army, attaining the rank of colonel; and was brevetted brigadier-general of volunteers 1865. He was thereafter a frequent contributor of sketches to magazines. Strother was U. S. consul-general in Mexico 1879-85.

STROUD, n. *strowd:* a kind of coarse blanket used by the North American Indians. STROUD'ING, n. a kind of coarse cloth employed in trading with the North American Indians. STROUDS, n. plu. among *seamen,* the several twists at the end of a cable or rope.

STROUDSBURG: Pa.; borough, county-seat of Monroe county; on Broadhead Creek, and on the Delaware, L. and W., and the New York, S. and W. R.R.s; about 25 miles north of Easton. It is in the Blue Ridge region, between the Delaware Water Gap and Mount Pocono. The climate, scenery, good water, and the good roads have made the place a favorite summer resort. There are public and private schools, and two national banks with a combined capital of $150,000. Pop. (1910) 4,379.

STROUSBERG, *strowss'bĕrg,* BETHEL HENRY (originally BARUCH HIRSCH STRAUSBERG): financier: 1823, Oct. 20—1884, May 31; b. Neidenburg, Prussia; of Jewish parentage. Losing his parents in his 12th year, he went to England and became a Christian. In London he was at first employed in the office of his uncles, commission merchants, but began to write for the press, and became proprietor of Sharpe's *London Magazine.* He also engaged in the business of life-insurance. He failed financially 1847, and settled in New Orleans, where he soon by speculation accumulated enough money to start in business again in London 1849. He visited Berlin 1855, and helped to organize the Eastern Prussian Railway Co. He settled in Berlin 1861, and began building railroads in Germany, Austria, etc. He purchased a vast estate in Bohemia, great locomotive works in Hanover, besides quarries, mines, etc.; he established beet-sugar works, porcelain factories, a cattle-market at Berlin, and engaged in many other vast enterprises. The crash came 1870, when the Roumanian railway had to pass payment

of its coupons. Strousberg was confined in prison at Moscow 1875-77. While in prison he wrote *Dr. Strousberg und sein Wirken.* He died in Berlin in great poverty.

STROVE, v. *strōv:* pt. of STRIVE, which see.

STROW, v. *strō:* same as STREW, which see. STROWED, pt. *strōd.* STROWN, pp. *strōn.*

STROZZI, *strŏt'sē:* the name of a wealthy and illustrious Florentine family. Palla, Filippo, and Piero were the three most renowned members of this princely house, between 1432 and 1537, and who were either exiled or lost their lives in the struggle for liberty against the power of the Medici family.

STROZZI, BERNARDO (IL PRETE GENOVESE, or IL CAPPUCINO): Italian painter: b. Genoa 1581; d. Venice 1644. He painted in the naturalistic style of Caravaggio, and produced many frescoes and easel pictures in oils. They are all of a somewhat crude character, and fiery coloring, though the design is strong.

STRUCK, v. *strŭk:* pt. of STRIKE, which see.

STRUCTURE, n. *strŭk'tūr* or *-chûr* [F. *structure*—from L. *structūrā,* a fitting together, construction—from *structus,* piled up; *struĕrĕ,* to pile up]: manner of building; make; form; manner of organization; a building of any kind; an edifice; that form or condition in which the component parts of minerals or rock-masses are arranged as in a granite quarry we find the rock arranged in large tabular or square-like masses—*texture* referring to the manner in which the component particles are internally arranged, as we find a piece of granite hard, close-grained, and crystalline. STRUC'TURAL, a. *-tūr-ăl,* of or pertaining to structure.

STRUENSEE, JOHANN FRIEDRICH: Danish statesman: b. Saxony 1733, Aug. 5; 1772, Apr. 23. He studied medicine, and in 1768 was appointed physician to the king of Denmark. He soon became a favorite, and effected the dismissal of all those who were obstacles to his own ambitious plans. In 1770 he advised the king to abolish the council of state, a measure which roused the indignation of the Danish nobility. Struensee by various means gradually usurped the administration of all affairs in the name of the king, and caused himself to be created count. His arrogance caused a conspiracy against him, and on 16 Jan. 1772, Struensee was seized, was found guilty of criminal relations with the queen, convicted, and executed.

STRUGGLE, v. *strŭg'gl* [Dan. *stryg,* a beating; *stryge,* to strike: Dut. *struikelen;* Low Ger. *strükeln;* Ger. *straucheln,* to stumble: see STRIKE, of which this is a frequentative]: to use violent efforts with twistings of the body; to use great efforts or exertions; to writhe; to strive; to contend; to labor hard: N. violent efforts

with twistings of the body; great efforts to attain an object or to avoid an evil; contest; strife; agony; contortions of extreme distress. STRUG'GLING, imp. *-glĭng:* ADJ. making great efforts; affected with contortions: N. vehement or earnest effort. STRUGGLED, pp. *strŭg'gld.* STRUG'GLER, n. *-glĕr,* one who struggles.

STRUGGLE FOR EXISTENCE. See DARWINIAN THEORY: ETC.

STRUM, v. *strŭm* [Sw. *trumma,* to beat, to drum: Ger. *strampfen,* to make a clattering motion with the feet: It. *strimpellare,* to scrape or play badly on an instr.]: to thump or make a noise; to play badly on an instr.; to play in a coarse noisy way, as on a piano. STRUM'MING, imp.: N. the persevering practice of a learner on a stringed instr. STRUMMED, pp. *strŭmd.*

STRUMA, n. *strô'mă* [L. *strūma,* a scrofulous tumor —from *struĕrĕ,* to pile up]: a diseased state characterized by a tendency to a swelling of the glands in various parts of the body; a scrofulous swelling or tumor; scrofula or king's evil. STRU'MOUS, a. *-mŭs,* or STRU'MOSE, a. *-mōz,* or STRUMATIC, a. *strô-măt'ĭk,* having struma; scrofulous.

STRUMPET, n. *strŭm'pĕt* [OF. *strupe, stupre*—from L. *stuprum,* concubinage]: a prostitute: ADJ. in *OE.,* like a strumpet; inconstant; false: V. in *OE.,* to make a whore; to debauch.

STRUNG, v. *strŭng:* pt. and pp. of STRING, which see.

STRUT, v. *strŭt* [Ger. *strotzen,* to be swollen or puffed out: Dan. *strutte, strude,* to strut: Low Ger. *strutt,* rigid, stiff]: to walk with affected dignity: N. a lofty proud step or walk with the head erect; affected dignity in walking. STRUT'TING, imp.: N. the act of walking in an affected manner. STRUT'TED, pp. STRUT'TER, n. *-tĕr,* one who struts. STRUT'TINGLY, ad. *-lĭ.*

STRUT: in architecture, a brace or support, either upright, horizontal or diagonal. The struts of a roof extend obliquely from a rafter to an upright post. Diagonal struts are frequently used in gates, doors, and between joists.

STRUTHION'IDÆ: the ostriches and related ratite birds.

STRUTT, JOSEPH: English antiquary: b. Chelmsford 1749, Oct. 27; d. London 1802, Oct. 16. He was articled to W. W. Ryland, the engraver, and obtained the gold and silver medals of the Royal Academy. In 1773 he published his *Regal and Ecclesiastical Antiquities from Edward the Confessor to Henry VIII.,* and shortly afterward his *Horda Angel-Cynnan, or Manners, Customs, etc., of the English* (1774-6). His other works include a *Chronicle of England* (1777-8); *Biographical Dictionary of Engravers* (1785-6); *Dresses and Habits of*

the People of England, etc. (1796-9); and *Sports and Pastimes of the People of England* (1801). He left some manuscripts, from which were afterward published his *Queenhoo-Hall*, a romance, concluded by Sir Walter Scott; *Ancient Times*, a drama; also *The Test of Guilt, or Traits of Ancient Superstition*, a tale.

STRUVE, Friedrich Georg Wilhelm von: German astronomer: b. Altona 1793, Apr. 15; d. 1864, Nov. 23. In 1813 he entered the Dorpat observatory, and was appointed director in 1817. On the completion of the Russian observatory at Pulkova, near Saint Petersburg, in 1839, he was nominated its director, and here he continued his researches on nebulæ and double stars. From 1816 to 1819 he was engaged on the triangulation of Livonia, and from 1830 to 1845 he was connected with the measurement of the arc of the meridian in the Baltic provinces, which was afterward extended to the Arctic Ocean and the Danube.

STRUVE, Otto Wilhelm: Russian astronomer: b. 1819, May 7. He early studied at the Dorpat and Pulkova Observatories, and on the death of his father succeeded him as director of the great Pulkova Observatory near Saint Petersburg. His work was given mostly to the observation of double stars, and to continuing the organization and administration of the great observatory founded by his father. He was the presiding officer of the International Astrophotographic Congress at Paris in 1877. In 1890 he resigned the directorship at Pulkova.

STRYCHNINE: $C_{21}H_{22}N_2O_2$, an alkaloid existing in the seeds of the Strychnos Nux-vomica, Saint Ignatius bean, and the other species of Strychnos. The Strychnos Nux-vomica is a tree of medium size growing in the East Indies. It bears a pulpy fruit about the size of an orange, containing the large seeds that are the drug nux-vomica. These seeds are circular, about three-quarters of an inch in diameter, an eighth of an inch thick, and very hard and horny. Rasped or filed they are used to kill cats, dogs, rats and vermin under the name of rats-bane or dog buttons. The active principle strychnine may be obtained by treating nux-vomica with alcohol containing a little sulphuric acid. This solution contains the strychnine as well as various coloring matters. From it the strychnine may be obtained in small white prismatic crystals, slightly soluble in water, giving it a bitter taste even in as dilute a solution as one part in seven hundred thousand. Strychnine is very poisonous, a small amount causing death with violent tetanic convulsions. It is, however, used extensively in very small doses in medicine, being valuable as a heart stimulant, and in cases of paralysis, nervous affections, dyspepsia, etc.

It is a weak base forming salts with acids. The

sulphuric acid salt or strychnia sulphate is used generally in place of the free alkaloid.

STRYCHNOS, *strĭk'nŏs:* genus of trees of nat. order *Loganicaceæ,* having a five-lobed calyx, a tubular funnel-shaped or salver-shaped corolla, with a five-partite limb, five stamens, a filiform style, numerous ovules, and a one-celled berry, with a leathery rind, many-seeded, or, by abortion, one-seeded, the seeds discoidal and compressed. To this genus belongs the *S. nux vomica,* tree of medium size, with ovate stalked leaves, native of India. Its fruit is produced in great abundance, and is about the size of a small orange; the seeds are the *Nux Vomica* of commerce, and yield *Strychnine:* see NUX VOMICA: POISONS. The bark partakes of the poisonous quality of the seeds. The wood of the tree is very hard and durable. The Clearing-nut (q.v.) and St. Ignatius' Bean (q.v.) are produced by species of this genus, to which belongs also the tree (*S. toxifera*) which produces the Woorali or Curare (q.v.) poison of S. America. Another species is the UPAS TIEUTÉ (*S. Tieute*) of Java, large climbing shrub, whose bark is extremely poisonous, containing a very large quantity of strychnine. The wood of a species found in n. India (*S. colubrina*), which is also a climber, is an imaginary cure for snake-bites. The bark of *S. pseudo-quina,* a Brazilian species, is used as substitute for cinchona.

STRYKER, *strīk'ĕr,* MELANCTHON WOOLSEY, D.D., LL.D.; educator: b. Vernon, N. Y., 1851, Jan. 7. He graduated at Hamilton Coll. 1872, and at Auburn Theol. Sem. 1876; was ordained Presb. minister the latter year; held (Presb.) pastorates in Auburn, N. Y., 1876-78; Ithaca, N. Y., 1878-83; Holyoke, Mass., (Congl.), 1883-85; Chicago 1885-92. In 1892 he was elected ninth pres. of Hamilton Coll. He received his degrees from Lafayette and Hamilton Colls. 1889. Among his publications are: *The Alleluia* (1880); *Church Praise Book* (1881); *Christian Chorals* (1885); *Church Song* (1888); *Song of Miriam and Other Verses* (1888); *Choral Song* (1891); and *Essays on the Dies Iræ,* with translations (1892).

STRYPE, *strīp,* JOHN: voluminous ecclesiastical historian: 1643, Nov. 1—1737, Dec. 11; b. London. He studied at Cambridge, entered the Anglican priesthood, and held for many years, together with smaller livings, the rectory of Low Leyton, Essex. His works fill 13 large folio vols. The most important are: *Memorials of Archbishop Cranmer* (1694); *Life of Sir Thomas Smith, Secretary of State to Edward VI. and Elizabeth* (1698); Lives of *Bishop Aylmer* (1701), *Sir John Cheke* (1705), *Archbishop Grindal* (1710), *Archbishop Parker* (1711), and *Archbishop Whitgift* (1718); *Annals of the Reformation* (I. 1709, II. 1723, III. 1728, IV. 1731); *Ecclesiastical Memorials* (3 vols., 1721).

STUART, ARABELLA (or ARBELLA), Lady: see STUART, ROYAL HOUSE OF.

STUART, *stū'ërt*, CHARLES EDWARD LEWIS CASIMIR, often called the younger Pretender: 1720, Dec. 31—1788, Jan. 31; b. Rome; eldest son of James Francis Edward, Prince of Wales, known as the elder Pretender or Chevalier St. George (see STUART, ROYAL HOUSE OF), and of his wife Clementina Sobieski, granddaughter of the celebrated Polish monarch John Sobieski. S. bore among the Jacobites (q.v.) the title Prince of Wales He served under Don Carlos in Spain, and is described as having been in his youth handsome, affable, and engaging in manners. In 1743, 28 years after his father's unsuccessful attempt to regain the British crown, a scheme was contrived in France, with the support of the Jacobites in England, by which S. was to recover the throne of Great Britain for his family. The first contrived project was to land an army in Kent, where were many adherents of the exiled house; and troops to the number of 15,000 were assembled, and transports provided at Boulogne, Dunkirk, and Calais, to carry them to England. But the squadron which was to have convoyed the transports fled before the British fleet under Sir John Norris; a storm destroyed the transports, and many of the troops were drowned. S., however, only awaited a favorable opportunity for a fresh attempt. 1745, July, when George II. was in Hanover, and Scotland almost without military, he sailed from Nantes, in company with the Marquis of Tullibardine and a few other devoted followers; and having landed in n. Scotland and summoned the Highland clans, which were devoted to the Stuart cause, he marched southward ten days later at the head of a large body of hardy mountaineers. Government offered a reward of £30,000 for the apprehension of the Pretender's son, who retaliated by offering a like reward for the apprehension of the Elector of Hanover—meaning King George II. At Perth, the insurgents were joined by the Duke of Perth and Lord Strathallan, with a numerous retinue; and on their approach, Edinburgh surrendered without resistance. S. took up his residence at Holyrood Palace, where he proclaimed his father king of Great Britain, and himself regent.

Meanwhile, Sir John Cope, commander-in-chief of the king's troops in Scotland, encamped at Prestonpans. He was there unexpectedly attacked by the Highlanders, and ignominiously routed. S., contrary to the advice of his council, advanced into England, though his force scarcely exceeded 6,500 men. Carlisle surrendered, and he proceeded as far as Derby. In the mean time, three English armies, each larger than his own, were preparing to meet him. Unable to raise recruits in England, he retreated into Scotland, hoping to meet a reinforcement under Lord John Drummond. On their way north, the Highlanders were pursued by the Duke of Cumberland, whom they defeated near Penrith. Finding Edinburgh in possession of the king's troops, S., joined by Lord John Drummond and Lord Strathallan, made his way to Stirling: the town sur-

rendered, and he laid siege to the castle. Gen. Hawley, endeavoring to raise the siege, was routed by Lord George Murray, at the head of the Macdonalds of Keppoch. But the advance of the Duke of Cumberland compelled the rebels to retreat further north. 1746, Apr. 16, the Duke of Cumberland encountered S.'s army on Culloden Moor. The Highlanders at first rushed boldly forward; but on the advance of the royal infantry, they gave way; the battle soon became a rout, and the fugitives were slaughtered by the dragoons, who gave no quarter. The rebels lost that day at least 1,000 men. S. escaped to the Hebrides, hunted by the king's troops; disguised in woman's attire, he was conveyed to Skye in an open boat by Flora Macdonald, daughter of Macdonald of Milton. For months he wandered in concealment among the mountains of Skye and the mainland, where he had many hair-breadth escapes; and though his secret was known to hundreds of the poorest of the people, no one was tempted by the £30,000 reward to betray him. He eventually escaped to France, and no further attempts were made to reinstate the exiled family.

S. remained in France till the peace of Aix-la-Chapelle (1748). It was a condition of that treaty that France should abandon the cause of the Stuarts; and as he refused to quit France, he was conducted with a guard out of the kingdom, and retired to Rome.

He married, 1772, Louisa Maximiliana de Stolberg-Guedern, daughter of Gustavus Adolphus, Prince of Stolberg-Guedern. The union was not happy, and the princess withdrew from him: see ALBANY, COUNTESS OF. In his latter years he was addicted to intoxication. When his claims ceased to be supported by any foreign power, he dropped the title Prince of Wales, and assumed that of Count of Albany. He died at Rome, and was buried at Frascati. There was no issue of his marriage.

Two brothers, generally known as John Sobieski S. and Charles Edward S., endeavored to persuade the world that they were legitimate grandsons of S. In fact they were sons of Capt. Thomas Allen, R.N., and grandsons of Admiral John Carter Allen, who died 1800. Their story was, that their father, instead of being Admiral Allen's son, was a son of S. and the Princess Louisa, whose birth was kept secret, from fear of the Hanoverian family, and who was intrusted to Admiral Allen, and passed off by him for his own son.

STUART, *stū'ert*, GEORGE HAY: b. England, 1816, Apr. 2, benevolent merchant in Philadelphia. He came to this country in his 15th year. In the civil war he was pres. of the U. S Christian Commission, and was a prominent promoter and often presiding officer of the Young Men's Christian Assoc. conventions, and an officer in the Bible, Tract, and Sunday-school societies. He was on the first board of U. S. Indian commissioners, after declining a cabinet place under Pres. Grant. He was a large giver to benevolent objects, and was noted in his Presb. denomination as an opponent of rigidity and exclusiveness. He d. 1890, Apr. 11.

STU'ART, Gilbert Charles: painter: 1755, Dec. 3—1828, July 27; b. Narragansett, R. I.; of Scotch descent. The family removed to Newport, where he was well educated. In his boyhood he went to Edinburgh with a Scotch painter named Alexander, with whom he studied his art; but, his master dying, he worked his passage home in a collier, and began to paint portraits at Newport. In 1775 he made his way to London, where he led for two years a Bohemian life; but his talent was recognized by his countryman Benjamin West, pres. of the Royal Acad., who took him as pupil and assistant into his family, and whose full-length portrait he painted for the National Gallery. In 1785 he opened his studio in London, and painted the portraits of George III., the Prince of Wales, the Duke of Northumberland, Sir Joshua Reynolds, John Kemble, and many other celebrated characters. He also made a professional visit to Dublin, and in Paris painted a portrait of Louis XVI. He married in London; and 1792, in the fulness of his powers and fame, he returned to the United States, and painted portraits of Washington, Jefferson, and many distinguished men; and began a portrait of John Quincy Adams, which at his death was finished by Sully. After residing about 11 years in Philadelphia and two years in Washington, he removed 1805 to Boston, where he died.—The first head of Washington painted by Stuart was in 1795; it gives the right side of his face, and is thought by some to be the most faithful portrait of the subject. The second was a full-length ordered by the Marquis of Lansdowne; and the third a head, upon an unfinished background, now in the Boston Athenæum—these two presenting the left side of the face. The last mentioned is the one that has been copied usually in book engravings and on U. S. notes and stamps; hence it has become the accepted image of Washington, though differing as much from portraits and busts of the same subject by other artists as these differ from each other. Stuart painted more than 60 copies of his Washington portraits. He is regarded as a leading master of his art, especially in modelling and in fresh, vital, permanent coloring.

STU'ART, James Ewell Brown: soldier: 1833, Feb. 6—1864, June 12; b. Patrick co., Va. He graduated from West Point 1854; served as a mounted rifleman in Texas, and became noted as an Indian fighter; was with his regt. during the border troubles in Kan. 1856; afterward engaged in quelling Indian disturbances, and was severely wounded; and aided in suppressing the John Brown raid in Va. 1859. By promotions he reached the rank of capt. 1861, Apr. 22; but resigned his commission in order to serve his native state under the Confederate govt. He soon became col. of the Va cavalry, and was connected with the army of Gen. J. E Johnston. He rendered efficient service at the battle of Bull Run; made numerous brilliant cavalry raids, was prominent in the seven days' battle before Richmond 1862, at the second battle of Bull Run, at South Mountain, Antietam, and Fredericksburg; made a raid on Dumfries and learned the plans of the

Union officers by sending forged telegrams to Washington; and after his superior officers were disabled was in command of Stonewall Jackson's corps at Chancellorsville, and managed his troops with great skill. In the Gettysburg campaign he made a raid in the rear of the Union forces which occupied so much time that the great issue was decided before he reached the field: the responsibility for this movement has been variously assigned. After several engagements with the Union cavalry, he was mortally wounded at Yellow Tavern while attempting to prevent Gen. Sheridan's troops from reaching Richmond. He was promoted brig.gen. 1861, and maj.gen. 1862, July 25. He died at Richmond.

STU'ART, Moses: biblical scholar and author: 1780, Mar. 26—1852, Jan. 4; b. Wilton, Conn. At 12 years of age he read Edwards's *Freedom of the Will*, and three years afterward 'learned the whole Latin grammar,' such as was then in use, in three days. Entering Yale as a sophomore 1796, he was the foremost scholar in his class. After teaching in N. Fairfield and Danbury, Conn., he began the study of law, but, while tutor at Yale, abandoned it for theology, and was ordained as pastor of the First Church (Congl.) in New Haven, 1806, where his remarkably eloquent ministry of nearly four years was signalized by large additions to the church. In 1810 he was inaugurated prof. of sacred literature in the Andover Theol. Seminary, which position he filled till 1848. During this period he wrote a *Grammar of the Hebrew Language*, without points, setting up a part of the type himself. He was 'a pioneer in the introduction of German literature into this country.' Notwithstanding his feeble health, he published numerous translations and original works, among which are: *Letters to the Rev. W. E. Channing; Hebrew Grammar*, with points (based on Gesenius); *Commentaries on the Epistle to the Hebrews* and the *Epistle to the Romans;* on the books of *Ecclesiastes, Proverbs, Daniel*, and the *Apocalypse; Hebrew Chrestomathy; Essay on the Liquor Traffic; Essay on Christian Baptism; Hints on the Prophecies; Conscience and the Constitution*—manifesting in all acuteness, vigor, and versatility. He died at Andover.

Prof. S.'s influence on biblical and linguistic scholarship in this country can scarcely be overrated. The wonderful vigor of his mind was an inspiration to successive classes of students: his teaching and his numerous writings opened a new era. In Europe also, where American scholarship then had little repute, he was accorded high rank. The fact is certainly notable that the degree D.D. is not known to have been conferred on him.

STUART (or STEUART, or STEWART), ROYAL HOUSE OF: renowned family, some of whose branches rose to the throne of Scotland, and ultimately to that of England. The origin of the family bearing this surname was long obscured by myth, but was rediscovered in the beginning of the 19th c.—Alan, son of Flahald, a Norman, accompanied the Conqueror into England, and obtained by his gift the lands and castle of Oswestry in Shropshire. His eldest son, William, remaining in England, became ancestor of the Fitzalans, Earls of Arundel, from whom the Duke of Norfolk inherits that earldom through an heiress. The second son, Walter, passing into Scotland in the service of David I., had large territorial possessions conferred on him by that monarch, with the dignity of Steward of Scotland, which became hereditary in his family, and was assumed by his descendants as a surname; some branches of the house, when spelling began to be considered, modifying the orthography to Steuart, or the French form Stuart. See STEWARD. The fess chequy adopted as the arms of the family is emblematical of the chequer of the steward's board. The connection between the Stewarts and Fitzalans was shown by the antiquarian, George Chalmers, to have been acknowledged as late as 1336.

The lands conferred on Walter the Steward by David I. included the barony, now the county of Renfrew, which became the chief patrimony of the family. For seven generations the stewardship descended without a break from father to son.—Walter, the third, and grandson of the first steward, held, in addition, the office of justiciary of Scotland.—His third son, Walter, called Balloch, by his marriage with the younger daughter of Maurice, Earl of Menteith, got the earldom of Menteith, and was ancestor of a line of earls and countesses of Menteith, of whom the Countess Margaret carried the earldom to her husband, Robert, Duke of Albany, son of King Robert II.—Alexander, fourth steward, was regent of Scotland in Alexander III.'s minority. From his second son, Sir John Stewart, who married the heiress of Bonkyl, sprang various important branches of the family, including the Stewarts of Darnley, Lennox, and Aubigné.—James, fifth Steward, was one of the six regents of Scotland after the death of Alexander III. —Walter, sixth steward, was conspicuous among Bruce's companions-in-arms; his marriage with Marjory, daughter of Robert Bruce, eventually brought the crown of Scotland to his family. His death at the age of 33 was lamented throughout Scotland.—His son by Marjory Bruce, Robert, seventh high steward, was regent 1338–41, and 1346–57; and in the midst of events which threatened overthrow to the liberties of Scotland, he exerted himself in their defense. On the death of David II. 1371, he ascended the throne as Robert II.; and died 1390. Of the children by his first marriage (legitimated by the pope's dispensation 1347), the third son, Robert, Duke of Albany, and his issue are noticed be-

low. The fourth son, Sir Alexander Stewart, who got the earldom of Buchan on the forfeiture of the Comyns, ruled in Scotland with little less than regal authority, and, from his savage and ferocious character was called the 'Wolf of Badenoch.' Some of his natural sons were progenitors of the Athole Stewarts.—For the subsequent history of the royal family, see ROBERT II.: ROBERT III.: JAMES I.: JAMES II.: JAMES III.: JAMES IV.: JAMES V.: MARY, QUEEN OF SCOTS: JAMES I. (of England): CHARLES I.: CHARLES II.: JAMES II.: WILLIAM AND MARY: ANNE.

James II. (of England) was twice married; first to Lady Anne Hyde, daughter of Lord Chancellor Hyde; secondly, to Mary Beatrice, daughter of the Duke of Modena. By the first marriage he had Mary, queen of William III., and Anne who succeeded to the throne, neither of whom left issue; and by the second, James, Prince of Wales (1688–1766): known as the Chevalier St. George or the elder Pretender. Prince James, born but a few months before his father's abdication, was commonly but groundlessly alleged to be a supposititious child, and was involved in his father's exclusion from the crown. In 1715, the party who supported him, known in history as the Jacobites (q.v.), endeavored to procure him the throne by force of arms. In Scotland, the Earl of Mar, with about 5,000 men, engaged the royal forces under the Duke of Argyll at Sheriffmuir: it was a drawn battle, but the result was a delay as fatal as a defeat. In England the rising was headed by the Earl of Derwentwater, and ended by the unconditional surrender of the insurgents at Preston, when Lords Derwentwater and Kenmure were beheaded, and other persons of note were put to death and attainted. James escaped to France; and for the rest of his life resided in obscurity, principally at Rome, where he died. In 1719, he married one of the wealthiest heiresses in Europe, Maria Clementina Sobieski, granddaughter of John Sobieski, King of Poland; and by her he had two sons, Charles Edward Lewis Casimir (b. 1720), known as the Young Pretender (see STUART, CHARLES EDWARD); and Henry Benedict Maria Clement, Cardinal York (1725–1807). Henry Benedict, second son of the Chevalier St. George, went to France 1745 to head an army assembled at Dunkirk for invasion of England; but the news of the defeat of Culloden put an end to his plan. He then returned to Rome, took orders in the church, and was advanced to the purple by Benedict XIV. 1747. During his older brother's life, he was known as Cardinal York; but after his death he assumed the regal style as Henry IX., King of England. His various bishoprics and rich church livings long enabled him to live in great splendor; but the expulsion of Pius VI. from Rome, and other events of the Revolution, drove him to Venice, aged and infirm, and in absolute poverty. The cardinal's deplorable situation becoming known to the British court, George III. settled on him an annuity of

£4,000. He died at the age of 82, last surviving descendant of James II.

Next to the exiled Stewarts in representation of the royal house as heir-of-line came the descendants of Henrietta Maria, daughter of Charles I., who was married to Philippe, Duke of Orleans, brother of Louis XIV. of France. This princess had two daughters, of whom the elder, Mary, was queen to Charles II. of Spain, but died childless; the younger, Anna Maria, married Victor-Amadeus, Duke of Savoy and King of Sardinia; and was mother to Charles-Emmanuel III., King of Sardinia, and grandmother to Victor-Amadeus III., King of Sardinia.—Victor-Amadeus had three sons who successively occupied the Sardinian throne as Charles-Emmanuel IV., Victor-Emmanuel I., and Charles-Felix; and a daughter who married Charles X. of France, and was mother of Henri, Duc de Bordeaux, representative of the French Bourbons.—Victor-Emmanuel and Charles-Felix left daughters only; and the senior co-representative as heir-of-line of the House of S., as well as that of Tudor, in recent years has been Maria Teresa, wife of Prince Louis of Bavaria and only child of the younger brother of the last Duke of Modena, grandson of Victor-Emmanuel IV. The house of Savoy-Carignan, from which the king of Italy springs, does not participate in the S. descent.

The branch of the family which the parliamentary settlement called to the British throne on the death of Anne were descendants of the Electress Sophia of Hanover, granddaughter of James VI. by her mother, the Princess Elizabeth Stewart, Electress Palatine and Queen of Bohemia. By this destination, not only were the already-mentioned descendants of Charles I.'s daughter, the Duchess of Orleans, excluded, but also the sons of the king of Bohemia and their descendants. The eldest son, Charles Lewis, Duke of Bavaria, is represented through his daughter, Duchess of Orleans, by the Comte de Paris, grandson of Louis Philippe, late king of the French. Queen Victoria is sixth in descent from and representative of the Electress Sophia—the line of descent being through George I.; George II.; Frederick, Prince of Wales; George III.; and Edward, Duke of Kent.

We have now to notice the most important cadets of the House of Stewart.

Dukes of Albany, Earls of March, Lords of Annandale and Man.—The dukedom of Albany was conferred on Alexander, second son of King James II. of Scotland, who also obtained the earldom of March, and lordship of Annandale and Man. Albany, falling under suspicion of James III., was arrested, and escaping to France, was attainted. He afterward took part in a plot with the discontented barons and Edward IV. of England to place himself on the throne, and joining the English army, captured Berwick. After making his peace with James, and being restored to his dukedom, he again rebelled, and invading Scotland with the Earl

of Douglas, was routed at Lochmaben, and once more attainted. By his second wife, daughter of Bertrand, Count de la Tour d'Auvergne, he had a son John, who was restored to the dukedom, assumed the regency of Scotland in James V.'s minority, and was declared heir to the throne, but did not survive James V.: he d. 1536.

DUKES OF ALBANY, EARLS OF FIFE AND MENTEITH.—Robert, second surviving son of Robert II. and Elizabeth Mure, obtained the earldom of Menteith by marriage with its heiress, and the earldom of Fife by indenture with his sister-in-law, the countess, and was appointed great chamberlain of Scotland 1383. He practically exercised the regency during his father's declining years, and continued to wield the supreme authority after the succession of his timid and irresolute brother, Robert III., who bestowed on him the title Duke of Albany—i.e., of all Scotland n. of the Forth and Clyde. His unscrupulous ambition led him to make riddance of his nephew, Duke of Rothesay, by starving him, to pave his own way to the throne. On Robert III.'s death, Albany at once became regent of Scotland, and wielded the chief power of the state during the minority and captivity of James I. By his first marriage to Margaret, Countess of Menteith, he had a son, Murdoch, who, on his father's decease 1419, succeeded to the regency. Duke Murdoch married the eldest co-heiress of the Earl of Lennox, and had four sons. On James I.'s restoration, his vengeance fell on Duke Murdoch, his sons Walter and Alexander, and his father-in-law, Lennox, who all were put to death, and the dukedom of Albany forfeited to the crown.

LORDS AVANDALE, OCHILTREE, AND CASTLESTUART; EARLS OF CASTLESTUART.—Andrew Stewart, grandson of Murdoch, Duke of Albany, was created Lord Avandale 1455, and was chancellor to James III. His nephew Andrew became 1488 second Lord Avandale. Andrew, third Lord Avandale, exchanged his title for that of Ochiltree; and was father of Andrew, second Lord Ochiltree, one of whose daughters became the second wife of John Knox. His younger son, James, was the unprincipled and arrogant favorite of James VI.'s early years; was chancellor of Scotland; was created Earl of Arran on the forfeiture of the Hamilton family; and enriched himself with the spoils of the estates of Angus, and other forfeited lords. But in 1585 he was stripped of his honors, offices, and spoils. Andrew, third Lord Ochiltree (grandson of the second lord), resigned the lordship of Ochiltree to his cousin, Sir James Stewart of Killeith, son of the Earl of Arran; and settled in Ireland, where extensive lands were bestowed on him by James VI., and 1619 was created Lord Stuart of Castlestuart in the peerage of Ireland. In 1800 Lord Castlestuart was created Earl of Castlestuart.

LORDS METHVEN.—Henry Stewart, second son of Andrew, second Lord Avandale, became, 1526, third husband of Princess Margaret of England, widow of James

IV., and divorced wife of Archibald, Earl of Angus. In 1528 he was created Lord Methven.

LORDS DOUNE, EARLS OF MORAY, LORDS ST. COLME.—Sir James Stewart of Beath, third son of Andrew, second Lord Avandale, obtained from James V. the hereditary command of the castle of Doune, with the stewartry of Menteith. His son James was created Lord Doune 1581. His son, second Lord Doune, married Elizabeth, only child of James Stuart, Earl of Moray, Regent of Scotland, natural son of James V. (see MURRAY, JAMES, Earl of); and thereupon became Earl of Moray.

EARLS AND MARQUISES OF BUTE, LORDS WHARNCLIFFE, LORDS STUART DE ROTHESAY.—Sir John Stuart, natural son of Robert II., was made hereditary sheriff of Bute and Arran; and his descendant and representative, Sir James Stuart, had a baronetcy conferred on him 1627. Sir James Stuart, grandson of the baronet Sir James, was raised to the peerage as Earl of Bute. The fourth earl was advanced to the marquisate of Bute. The present peer is the third marquis. Two grandsons of the third earl were raised to the peerage as Lord Wharncliffe.

EARLS OF ANGUS.—Sir John Stewart (commonly called of Bonkyl), brother of James, fifth steward of Scotland, was progenitor of some of the most prominent branches of the family, and direct ancestor in the male line of James VI. and the Stuart kings who followed him. His eldest son was father of Sir John Stewart, created Earl of Angus 1329.

EARLS OF DARNLEY, EARLS AND DUKES OF LENNOX, LORDS OF AUBIGNÉ.—Sir Alan Stewart of Dreghorn, second son of Sir John of Bonkyl (see above), who with his brothers, John and James, fell at Halidon Hill 1333, was ancestor of this distinguished line. His eldest son, Sir John Stewart of Darnley, distinguished himself in the French wars, and was constable of the Scots army in France; for which the lordship of Aubigné of France was conferred on him, as well as the county of Evreux. His marriage with Elizabeth, one of the daughters and co-heirs of Duncan, Earl of Lennox, afterward added the Lennox estates to the family possessions. His grandson, Bernard Stuart, third Lord of Aubigné, distinguished alike for soldiership and statesmanship, held, among other dignities, those of Viceroy of Naples, Constable of Sicily and Jerusalem, and Duke of Terra Nova. His grandson, Sir John Stuart, was made Lord Darnley and claimed the earldom of Lennox. His grandson, John, third Earl of Lennox, was taken prisoner at Linlithgow, and murdered by Sir James Hamilton of Finnart, Arran's natural son. His son, Matthew, fourth Earl of Lennox—by the termination of the male line of Robert III. at the death of James V., with the imperfect legitimacy of the descendants of the house of Albany—was placed in the position of heir-male of the stewards of Scotland. He married Lady Margaret Douglas, only child of Archibald, Earl of Angus, by the

queen-dowager Margaret, sister of Henry VIII.; an alliance which brought his children into the position of being nearest heirs after Mary, Queen of Scots, to the crown of England. The issue were two sons, the elder of them the unhappy husband of the unhappy Queen Mary, and father of James VI. After Queen Mary's forced resignation, Lennox was appointed to the regency; and on his way to hold a parliament at Stirling 1571, he was attacked by a party of the queen's friends, and mortally wounded.

The earldom and estates of Lennox, which, on the death of the fourth earl, had devolved on James VI. by right of blood, were conveyed by him to his uncle, Charles fifth Earl of Lennox, brother of Lord Darnley. The marriage of this earl 1574, with a sister of the first Earl of Devonshire, gave great displeasure to Elizabeth, whose own doubtful legitimacy made her very sensitive to possible pretensions to the throne. The sole issue of that union was a daughter, Arabella, and the earldom went in succession to the fifth earl's uncle, Robert, Bp. of Caithness, and to his cousin, Esme, son of John Stewart, Lord of Aubigné, youngest son of the third Earl of Lennox, who was created Duke of Lennox. The near relationship to the crown, both of England and Scotland, in which the fifth earl's daughter, the unfortunate Lady Arabella Stewart, stood, made her an object of jealousy equally to James and Elizabeth. Elizabeth first interfered to prevent her contemplated marriage with her cousin, Esme, Duke of Lennox, and afterward imprisoned her for listening to overtures from a son of the Earl of Northumberland. The result was, that this lady formed an illicit connection with William Seymour, afterward Marquis of Hertford; on discovery of which, both were summoned by James before the privy council, and severely reprimanded. The consequence was the reverse of what was intended. Lady Arabella privately married Seymour; which becoming known, she and her husband were committed into custody. Both effected their escape: Lady Arabella was overtaken in Calais Roads, and imprisoned in the Tower, where these undeserved oppressions drove her into lunacy, in which she died 1615.

Lord Pittenweem.—A descendant of Alexander Stewart of Galston, younger brother of the first Lord Darnley, was made Lord Pittenweem.

Stuarts of Castlemilk.—The earliest proved ancestor of this branch was Sir William Stewart of Castlemilk, 1398. Archibald Stuart of Castlemilk was created a baronet of Nova Scotia by Charles II.

Steuarts of Allanton, Coltness, etc.—This family, which came into notice in the 16th c., is of unascertained descent. Sir James Steuart of Coltness and Kirkfield, younger brother of Sir Walter of Allanton, and his son, Sir Thomas, were active Covenanters; and the latter, the framer of the act of 1690 for regulation of the Church of Scotland, was made a baronet 1698. Sir Rob

ert Steuart, fourth baronet, filled the natural-philosophy chair in the Univ. of Edinburgh, in the beginning of the 18th c., in which chair his son succeeded.

Earls of Galloway.—Sir Walter Stewart of Dalswinton, third son of Sir John of Bonkyl, obtained the lands of Dalswinton from King Robert Bruce, and Garlies from his nephew, John Randolph, Earl of Moray. His great-granddaughter, Marion, married Sir John Stewart, son of Sir William Stewart of Jedworth; and Sir Alexander Stewart of Garlies, eighth in descent from Sir John and Marion Stewart, was created Lord Garlies 1607, and Earl of Galloway 1623. In 1796, John, seventh Earl of Galloway, was created a British peer as Baron Stewart of Garlies.

Lord Blantyre.—This branch of the house of S. is descended from Sir Thomas Stewart of Minto, one of whose descendants, 1606, was raised to the peerage as Lord Blantyre.

Viscounts Mountjoy, Earl of Blessington.—Sir William Stewart, descended from Walter Stewart of Tonderghie, was made a baronet of Ireland 1623. His grandson, Sir William Stewart, second baronet, was 1682 created Baron Stewart of Ramalton, and Viscount Mountjoy in the peerage of Ireland. The second viscount, his son, married the daughter and eventually heiress of Viscount Blessington; and their son, third Viscount Mountjoy, was advanced to the earldom of Blessington.

Earls of Athole, Lords of Lorn and Innermeath.—Sir James Stewart, fifth son of Sir John of Bonkyl, killed with his brothers Alexander and John at Halidon Hill, had two grandsons, John and Robert, who married the two co-heiresses of the princely house of De Ergadia, Lord of Lorn, who were also co-heirs of the line of Robert Bruce. The younger son, Robert of Durrisdeer, was ancestor of a line of Stewarts of Rossyth and Craigiehall, to which line Oliver Cromwell's mother was said by some authorities to have belonged: but this relationship has been disproved in recent years. The elder son, Sir John, whose wife was the elder and principal coheiress, had five sons: the eldest, Robert, became Lord of Lorne; the third, Sir James, known as the Black Knight of Lorn, was husband of James I.'s widow; and his eldest son, brother uterine of James II., was created Earl of Athole. His great-grandson, John Stewart, fourth Earl of Athole, was much involved in the political events of Mary's and James VI.'s time. An adherent of the old faith, and at first a stanch supporter of the queen, he nevertheless assisted in her seizure, and was a leader in the association 1567 for the defense of James VI. In 1577, he became chancellor of Scotland, and died suddenly under suspicion of poison from Morton. His son, fifth Earl of Athole, had no male issue; and at his death, the earldom fell to the crown, and was conferred on the elder branch of the House of Innermeath.

Robert, Lord of Lorn, eldest brother of the Black Knight, had two sons. The elder of these, John, second

Lord of Lorn, had three daughters, through one of whom, who married the Earl of Argyll, the lordship of Lorn passed to the Argyll family. The second son of Robert, Lord of Lorn, was Walter, Lord Innermeath, whose descendant and representative, John, sixth Lord Innermeath, obtained the earldom of Athole on the death of the above-mentioned fifth earl. The earldom of Athole was then conferred by Charles I. on the Earl of Tullibardine, grandson through his mother of the fifth Earl of Athole, from whom the existing ducal House of Athole is descended.

EARLS OF BUCHAN.—The earldom of Buchan was 1469 bestowed on James Stewart, second son of the Black Knight of Lorn. His legitimate line ended in the fourth generation in an heiress, Christian, Countess of Buchan, who, marrying a son of Sir Robert Douglas of Lochleven, carried the earldom of Buchan into his family.

EARLS OF TRAQUAIR.—James Stewart, first Earl of Buchan, had, besides his lawful issue, a natural son, James, legitimated 1489, on whom his father conferred the lands of Traquair. His descendant, Sir John Stuart, was created by Charles I. Lord Stuart of Traquair 1628, and 1633 Earl of Traquair. The title became extinct or dormant on the death of the eighth earl 1861.

Many works have been written to elucidate the history of the S. family, or particular branches of it, including Symson's *General and Historical Account of the Stewarts* (Edin. 1712); Duncan Stewart's *Historical and Genealogical Account of the Royal Family of Scotland, and of the Surname of Stewart* (Edin. 1739); Noble's *Historical Genealogy of the Royal House of Stewart* (Lond. 1795); and Andrew Stuart of Castlemilk's *Genealogical History of the Stewarts* (Lond. 1798), a work full of laborious research, but nearly confined to the Houses of Darnley, Lennox, and Castlemilk; Chalmers's *Caledonia* (1807–24).

STUB, n. *stŭb* [Dut. *stobbe;* Low Ger. *stubbe*, a stump: Dan. *stub*, a stump, stubble: Gael. *stob*, a stake or stump]: the stump of a tree; something short and thick, like a *stub:* V. to grub up by the roots; to extirpate. STUB'BING, imp. STUBBED, pp. *stŭbd:* ADJ. short and thick; blunt: in *OE.*, hardy. STUBBY, a. *stŭb'bĭ*, abounding in stubs; short and thick. STUB'BINESS, n. *-nĕs*, the state of being stubby. STUB-END, in *mech.*, the enlarged end of a connecting-rod to which the strap is fastened. STUB-NAIL, a nail broken off; a short thick nail.

STUBBLE, n. *stŭb'bl* [OF. *estouble;* Ger. and Dut. *stoppel*, the stubs of corn—from STUB, which see]: the stumps or root-ends of corn left in the ground after the corn has been cut down. STUBBLED, a. *stŭb'bld*, covered with stubble. STUBBLE-FED, a. fed among the fine natural grass which grows among stubble, as cows or geese.

STUBBORN, a. *stŭb'bérn* [from STUB, which see]. unbending, like a stub; rigid; obstinate; inflexibly headstrong. STUB'BORNLY, ad. *-lĭ*, inflexibly; obstinately. STUB'BORNNESS, n. *-nĕs*, obstinacy; stiffness; want of pliancy.—SYN. of 'stubborn': inflexible; obdurate; stiff; hardy; firm; refractory; intractable; heady; contumacious; rugged; persistent; persevering; steady; harsh; rough.

STUBBES, JOHN: English author: b. about 1841; d. about 1600. He is celebrated as the author of a pamphlet entitled *The Discoverie of a Gaping Gulf, wherein England is like to be swallowed by another French Marriage* (1579), directed against Elizabeth at the time when negotiations for her hand were being made by the Duke of Anjou. For this presumption he, together with his printer, had his right hand cut off.

STUBBES, PHILIP: English author: b. about 1555; d. London about 1610. He was educated at Cambridge, and in 1581 began to write a series of ballads and other pamphlets directed against the sinful practices of various persons whose conduct did not reach his puritanical standard, and later published a broadside against the English public, entitled, *A View of Vanitie and Alarum to England, or Retrait from Sinne.* This was followed by his more ambitious and better known arraignment of the world in general, which he called *The Anatomie of Abuses, conteyning a Discoverie or Briefe Summarie of such Notable Vices and Imperfections as now raigne in many Christian Countreyes of the World,* which was published in 1583. His later diatribe *A Chrystal Glasse for Christian Women* (1591) was still more widely known.

STUBBS, CHARLES WILLIAM; M.A.; D.D.: English Anglican clergyman and author: b. Liverpool 1845, Sept. 3. He was educated at Cambridge, took holy orders and was vicar of Granborough, 1871-84; of Stokenham, Devonshire, 1884-8; and rector of Wavertree, Liverpool, 1888-94. Since the last named date he has been dean of Ely. He has been select preacher at Cambridge, 1881-95, at Oxford, 1883 and 1898, and at Harvard, 1900. He has traveled and lectured extensively in the United States, and has published *Christ and Democracy* (1883); *For Christ and City* (1890); *A Creed for Christian Socialists* (1896); *The Social Teaching of the Lord's Prayer* (1900); *Castles in the Air,* Poems (1903); *Cambridge and its Story* (1904); etc.

STUBBS, WILLIAM: English prelate and historian: b. Knaresborough, Yorkshire, 1825, June 21; d. 1901, Apr. 22. He was educated at Oxford University, took Anglican orders in 1848, and was vicar of Navestock, Essex, 1850-60. He was librarian of Lambeth Palace 1862-8 and regius professor of modern history at Oxford 1866-84. In 1869 he became curator of the Bodleian

Library, and was rector of Cholderton, Wiltshire, 1875-84. He became in 1879 canon residentiary of Saint Paul's, in 1884 bishop of Chester, and in 1888 bishop of Oxford. He edited many valuable historical works in the Rolls Series, including *Chronicals and Memorials of the Reign of Richard I.* (1864-5); *Gesta Regis Henrici II.* (1867); *Chronicle of Roger Hoveden* (1872-3); *Memorials of Saint Dunstan* (1874); and *Opera Radulphi de Diceto* (1876), but is best known by his *Constitutional History of England* (1874-8), a work which is well nigh indispensable to the student of English history. Among other works of his are: *The Early Plantagenets* (1876); *Seventeen Lectures on the Study of Mediæval and Modern History* (1886).

STUBBY. See under STUB.

STUCCO, n. *stŭk'kō* [It. *stucco,* a kind of fine plaster —from OHG. *stucchi,* a crust]: composition used for the finer internal plaster-work, cornices, enrichments, etc.—made of lime and pounded gypsum (q.v.) or pulverized marble; white powder of calcined gypsum mixed with thin glue, used extensively for making figures, ornaments, and casts: a coarser stucco is used for making floors, and for plastering the exterior of buildings: V. to cover or overlay with stucco. STUC'COING, imp. STUC'COED, pp. *-kōd:* ADJ. plastered with stucco. STUC'-COER, n. *-ėr,* one who stuccoes.

STUCK, v. *stŭk:* pt. of STICK, which see. STUCK, n. in *OE.,* a thrust. STUCK-UP, a. stiffly and affectedly vain; exclusive; self-important and puffed up; an Australian expression signifying 'robbed on the highway.'

STÜCK, FRANZ: German painter: b. Tettenweis, Lower Bavaria, 1863, Feb. 23. He received his early art training in the academy at Munich and exhibited striking and original talent by his fantastic and grotesque designs, many of them furnished as illustrations to the *Fliegende Blätter,* as book covers, vignettes for programmes, etc. In 1889 he made his début as a painter in oils with *The Seraph at the Gate of Paradise;* and numerous other biblical, mythological, and allegorical works followed which attracted attention by their combination of mystical symbolism with strength of expression and spiritual intensity. His chief works are: *Lucifer; The Expulsion from Paradise;* a *Pieta; The Crucifixion;* etc. He has also produced several statuettes and bronze figures, and is professor royal in the Munich Academy.

STUD, n. *stŭd* [Icel. *stod;* Sw. *stöd,* a post: Dan. *stöd,* a stump]: a knob or projecting head of a nail or button; an ornamental knob; a double-headed ornamental button removable at will; a supporting beam inserted in a sill; a stay; a prop: V. to adorn with

studs or knobs; to set with projecting or prominent ornaments. STUD'DING, imp.: N. material for studs or joists; joists, considered collectively. STUD'DED, pp. STUD'DING-SAILS, narrow sails set at the outer edges of the square-sails when the wind is light.

STUD, n. *stŭd* [Ger. *gestüt;* Dan. *stod,* a stud: Ger. *stute,* a mare: Pol. *stado,* a collection of breeding-horses]: a collection of breeding-horses and mares. STUD-HORSE, a breeding-horse; a stallion.

STUDEBAKER, HENRY: b. East Berlin, Pa., 1826; CLEMENT, b. Gettysburg, Pa., 1831; JOHN MOHLER, b. Gettysburg, Pa., 1833; PETER E., b. Ashland, Ohio, 1836; JACOB F., b. Ashland, Ohio: builders of vehicles: Henry and Clement, having received a common school education and having learned their father's trade, wagon-making, moved from Ashland, Ohio, in 1852, and settled in South Bend, Ind. Here they opened a blacksmith shop, shod horses, built two wagons the first year, and laid the foundation for their greater successes. Their cash capital and stock in trade was $68. In 1858 Henry retired from the firm of H. & C. Studebaker, his interest being purchased by John Mohler, the third son, for $5,200. A few years later Peter E. joined his brothers and located the first repository for the sale of their output at Saint Joseph, Mo. In 1868 they were incorporated as a stock company, capital $75,000. As the business grew, Jacob F., the youngest brother, was taken into the firm.

In 1872 their factory n. of the Lake Shore & Michigan Southern railway was completely destroyed by fire, entailing a loss of $80,000. New works were erected, to be burned in 1874, the loss amounting to $350,000, including 2,400 wagons; but out of the ashes grew a modern factory, splendidly equipped with improved facilities, almost doubling the former output in capacity and making all types of vehicles. These works are now the largest wagon and carriage manufactory in the world.

STUDIO, n. *stū'dĭ-ō* [It. *studio,* study, a school (see STUDY)]: an artist's study or workshop.

STUDY, n. *stŭd'ĭ* [L. *studĭum,* application to a thing —from L. *studĕō,* I am eager, I apply myself: It. *studio;* F. *étude,* study]: the application of the mind or thoughts to a subject for the purpose of learning what was not before known; deep attention; any particular branch of learning on which the mind may be set in order to its acquirement; subject of attention; a place allotted to study; in the *fine arts,* a work undertaken for improvement; the sketched ideas of a painter: V. to fix the mind closely upon a subject in order to understand it; to learn by application; to dwell upon in thought; to muse; to apply the mind to; to consider attentively. STUD'Y-ING, imp. *-ĭ-ĭng.* STUD'IED, pp. *-ĭd,* closely examined; well considered: ADJ. learned; premeditated; thought out. STUDENT, n. *stū'dĕnt,* one engaged in study; one

preparing for a liberal profession by attending a university or great school; a scholar or learner. STU'DENTSHIP, n. state or time of being a student. STU'DENTRY, n. *-dĕnt-rĭ*, a body of students. STU'DIOUS, a. *-dĭ-ŭs*, devoted to the acquisition of knowledge from books; thoughtful; eager to discover something, or to effect some object; diligent; busy. STU'DIOUSLY, ad. *-lĭ*. STU'DIOUSNESS, *-nĕs*, the quality of being studious.

STUFA, n. *stō'fă* [It. *stufa*, a stove, a hothouse]: a fissure or orifice in a volcanic district from which jets of steam issue, often at a temperature much above that of boiling water.

STUFF, n. *stŭf* [Ger. *stopfen*, to fill up a cavity, to stop; F. *estouffer*, to stifle, to smother: Ger. *stoff*, stuff, matter, substance: It. *stoffa*, stuff, material: mid. L. *stuppārĕ*, to cram—from L. *stuppa*, tow (see also STOP)]: any collection of substances; any mixture or medicine; materials of which anything is made; the woven fabric of which clothes are made; something trifling or worthless; trash; that which fills anything; in *OE.*, elemental part; essence: V. to fill very full; to crowd; to press; to cause to swell out by putting something in; to thrust into; to fill meat with seasoning; to fill, as the skin of a dead animal for preserving its likeness; to feed gluttonously; to obstruct, as one of the organs; to obstruct the organs of scent or respiration, as by a cold. STUF'FING, imp.: N. that which is used for filling anything; in *cookery*, force-meat used for filling the bodies of small animals, e.g., poultry, or for filling openings made for the purpose in large joints. It usually consists of bread-crumbs, savory herbs and other seasonings, minced very fine. STUFFED, pp. *stŭft*. STUFFER, n. *stŭf'fĕr*, one who stuffs. STUFFY, a. *stŭf'fĭ*, close; confined, as a room; in *Scot.*, stout; brave. HOUSEHOLD STUFF, the goods with which a house is filled to fit it for occupation. STUFFING-BOX, the packed arrangement of a quantity of hemp or India-rubber at the end of a piston-rod working in a cylinder, or where it passes through the cylinder cover, by which the part is rendered close-fitting and tight.

STUHLWEISSENBURG, *stōl-vī'sĕn-bûrch* (Hung. *Székes Fejérvár*, Slav. *Bielihrad* or *Bialigrad*, L. *Alba Regalis* or *Alba Regia*): royal free town of Hungary, seat of a bishop, formerly cap. of the kingdom; in a swampy but fertile plain near the marshes of Sár-Rét; 16 m. n.e. of Lake Balaton. The principal buildings are the splendid Cathedral of the Virgin Mary, the Church of St. John, and the bishop's palace. It has several Rom. Cath. schools, a milit. acad., and a theatre. The manufactures are cotton cloths, flannels, leather, silk, and knives ('Stuhlweissenburg clasp-knives'); and soda is extracted from the swamps, which are, moreover, rich in fish, crabs, tortoises, and water-fowl. The horse-fairs are famous. S. is on the site of the Roman *Floriana*, and 1027 to 1527 was the place where the kings of Hungary were crowned and buried, 14 of whom repose here. In later times it was for some years in the hands of the Turks. Pop. 30,000.

STULTIFY, v. *stŭl'tĭ-fī* [L. *stultus*, foolish; *faciō*, I make]: to cause to appear foolish, unmeaning, or contradictory; to prove to be void of understanding. STUL'TIFYING, imp. STUL'TIFIED, pp. *-fīd*. STUL'TIFICA'TION, n. *-fĭ-kā'shŭn*, the act of making foolish; the state of being stultified.

STUM, n. *stŭm* [Dut. *stom*, dumb, wine that has not worked from being over-sulphured: Ger. *stumm;* Dan. and Sw. *stum*, dumb]: in *OE.*, unfermented wine; must; wine revived by fermenting anew: V. to renew or doctor with stum. STUM'MING, imp. STUMMED, pp. *stŭmd*.

STUMBLE, v. *stŭm'bl* [prov. Sw. *stambla, stomla*, to stumble: Norw. *stumpa*, to stumble, to totter: prov. Dan. *stumle*, to strike the ground with the feet]: to make a false step; to trip in walking; to strike the foot against an obstacle in walking; to slide into crime or error; to light on by chance: N. a trip in walking or running; a blunder; a failure. STUM'BLING, imp.: N. act of one who stumbles. STUMBLED, pp. *stŭm'bld*. STUM'BLER, n. *-blĕr*, one who stumbles. STUM'BLINGLY, ad. *-blĭng-lĭ*. STUMBLING-BLOCK, that which causes a person to stumble or fall into error; an obstruction.

STUMP, n. *stŭmp* [Dut. *stomp;* Icel. *stumpr;* Sw. and Dan. *stump;* Ger. *stumpf*, a stump: Dut. *stompen;* Bav. *stumpen*, to push, to thrust]: the end remaining after something has been cut or worn off; the remaining part of the trunk of a tree after being cut down; an artist's soft pencil or rubber; in *cricket*, one of a set of three rods or posts of wood which support the bails and constitute the wicket: V. to lop; to curtail; to walk about heavily and clumsily; to deliver electioneering speeches; in *cricket*, to knock down a stump so as to put a batsman out of play. STUMP'ING, imp. STUMPED, pp. *stŭmpt*, in *slang*, ruined; deceived. STUMPY, a. *stŭmp'ĭ*, resembling a stump; stout and thick. STUMP-ORATOR, a man who harangues the multitude on a passing topic, generally political. To STUMP OUT, in *cricket*, to knock down the stump or wicket before the batsman has reached it; to put down; to outwit. To STUMP UP, in *slang*, pay your reckoning or share; pay ready money down.

STUN, v. *stŭn* [AS. *stunian*, to resound, to dash: Ger. *staunen*, to be amazed]: to stupefy with noise or with a blow; to make senseless. STUN'NING, imp. ADJ confounding with noise; astonishing. STUNNED, pp. *stŭnd*. STUN'NER, n. *-nĕr*, one who or that which stuns; in *slang*, something splendid; a fine fellow.

STUNDISTS, *stŭn'dĭsts:* Russian sect of dissenters, said to have been formed in Kherson 1817 by colonists from Würtemberg, but not known as a sect until about 1860. Their number has been stated as a million, but this is improbable. They were most numerous (1871) in the province of Kherson, s. Russia, where there were 800; and at Tarachtschd, near Kiev, there were 450. Their name is from the German *stunden*, hours or lessons, referring to their meetings for reading the Bible, which volume they believe

every one is free to interpret in his own way. They recognize no sacraments except baptism and the Lord's Supper, both observed with simplicity. The cult of saints, images, and observance of Lent, etc., they reject. While submitting to civil laws, they disown the authority of Hierarchies. In character and habits they are pure, honest, sober, and industrious.

STUNG, v. *stŭng:* pt. and pp. of STING, which see.

STUNK, v. *stŭngk:* pt. and pp. of STINK, which see.

STUNT, v. *stŭnt* [Icel. *stuttr*, short: old Sw. *stunt*, docked, short; *stunta*, to shorten: Ger. *stutz*, anything cropped; *stutzen*, to shorten (see also STINT)]: to hinder from growth or increase. STUNT'ING, imp. STUNT'ED, pp.: ADJ. hindered in growth; dwarfed. STUNT'EDNESS, n. *-nĕs*, the state of being stunted.

STÛ'PA: Buddhist monument: see TOPE.

STUPE, n. *stūp* [L. *stūpā;* Gr. *stūpē*, tow]: cloth or flax dipped in warm medicaments and applied to a sore or wound; a fomentation: V. to dress with stupes; to foment. STU'PING, imp. STUPED, pp. *stūpt*. STUPA, n. *stū'pă*, in *bot.*, a tuft or mass of hair or fine filament matted together. STUPOSE, a. *stū-pōs'*, having a tuft of hairs; composed of matted filaments.

STUPEFY, v. *stū'pĕ-fi*, written also, but less properly, STU'PIFY [F. *stupéfier*—from L. *stupĕfacĕrĕ*, to make stupid—from *stupĕō*, I am stupefied; *facĭō*, I make]: to make stupid; to deprive of sensibility; to blunt or deaden, as the faculty of perception. STU'PEFYING, imp. STU'PEFIED, pp. *-fīd*. STU'PEFIER, n. *-fī-ĕr*, one who or that which stupefies. STU'PEFAC'TION, n. *-făk'shŭn* [F. *stupéfaction*]: a stupid or senseless state; act of rendering stupid; torpor; stupidity. STU'PEFAC'TIVE, a. *-tĭv*, tending to cause insensibility; narcotic.

STUPENDIOUS, a. *stū-pĕn'dĭ-ŭs:* OE. for STUPENDOUS.

STUPENDOUS, a. *stū-pĕn'dŭs* [L. *stupen'dus*, stunning, astonishing—from *stupĕō*, I am stunned or stupefied]: overcoming the senses by its vastness; amazing; wonderful; of astonishing magnitude. STUPEN'DOUSLY, ad. *-lĭ*. STUPEN'DOUSNESS, n. *-nĕs*, the quality or state of being stupendous.

STUPID, a. *stū'pĭd* [F. *stupide*—from L. *stupĭdus*, amazed—from *stupĕō*, I am stupefied]: deficient in understanding; dull; senseless; sluggish of apprehension; done without the proper exercise of reason or judgment; foolish. STUPIDITY, n. *stū-pĭd'ĭ-tĭ*, or STU'PIDNESS, n. *-nĕs*, extreme dulness of understanding; sluggishness. STU'PIDLY, ad. *-lĭ*.—SYN. of 'stupid': simple; insensible; sluggish; doltish; sottish; dull; heavy.

STUPIFY: the less proper spelling of STUPEFY (q.v.).

STUPOR, n. *stū'pŏr* [L. *stupor*, stupor]: a state of body in which sense is either wholly or partially suspended: torpor; insensibility; extreme amazement or astonishment; moral stupidity.

STUPOSE: see under STUPE.

STUPRATE, v. *stū'prāt* [L. *stuprātus*, ravished; *stuprāre*, to ravish—from *stuprum*, adultery]: to debauch; to ravish. STUPRA'TING, imp. STUPRA'TED, pp. STUPRA'TION, n. *-prā'shŭn*, rape.

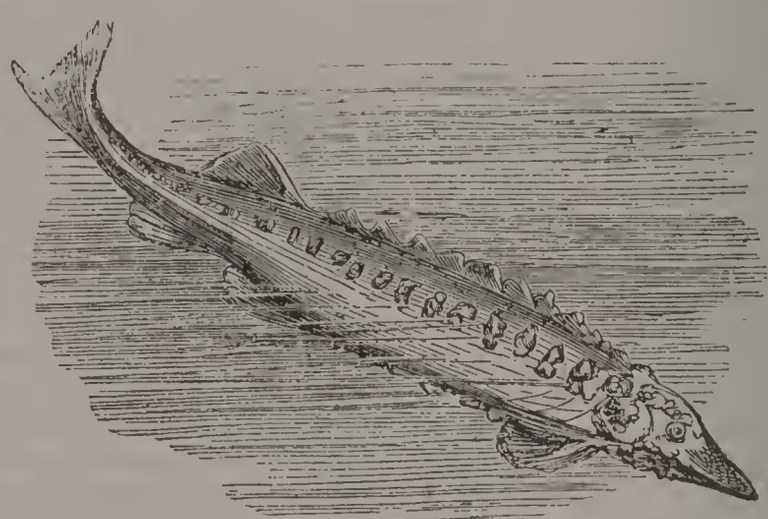
STURDY, a. *stėr'dĭ* [Bret. *stard*, firm, solid: Icel. *stirdr*, stiff, unbending]: stout; strong; hardy; bluntly obstinate; laid on with strength, as strokes. STUR'DILY, ad. *-dĭ-lĭ*. STUR'DINESS, n. *-nĕs*, stoutness; hardiness.

STURDY, n. *stėr'dĭ*, or THE GID [Gael. *stuird*, vertigo, a disease in sheep: It. *stordire*, to make dizzy or giddy in the head: W. *twrdd*, noise, stir]: disease in sheep, and sometimes in cattle, caused by a parasite in the brain. The parasite is a hydatid, reaching sometimes the size of a hazel-nut, and floating in a watery fluid inclosed in a membranous sac. The diseased condition in sheep is known also as Giddiness and Staggers. The parasite producing it, formerly termed *Cœnurus cerebralis*, is now known to be the larva of *Tænia cœnurus*, the tapeworm of the dog. In the state of ova, the hydatid embryo is taken up with the grass, passes into the blood, and is thence laid down in the soft loose textures of the brain. It is most frequent in low damp pastures, and among sheep 6 to 20 months old. The animal cannot properly seek its food, loses condition, staggers when moved, turns stupidly round almost in one spot, and usually toward the side on which the hydatid lies. The parasite and its sac may generally be safely removed by placing the sheep, with its feet tied, on a table or bench, searching for the softened portion of the skull, which generally overlies the hydatid, laying back a flap of skin, and introducing the trochar and canula, and, when the sac is deep-seated, cautiously withdrawing it with the help of a small syringe. Protected by a leather cap and simple water-dressings, the wound speedily heals.

STURGE, *stėrj*, JOSEPH: author and philanthropist: 1793, Aug. 2—1859, May 1; b. Elverton, Gloucestershire, England. He was a member of the Soc. of Friends; was one of the first to advocate the abolition of slavery, and soon became prominent among anti-slavery leaders. To observe the practical workings of slavery, he visited the W. Indies, and later the United States. In 1838 he published *The West Indies in* 1837; and in 1842, *Visit to the United States in* 1841. He acquired large wealth as a corn-factor in Birmingham, where he died.

STURGEON, n. *stėr'jŏn* [F. *esturgeon;* Sp. *esturion;* It. *storione*, a sturgeon: OHG. *sturjo;* mid. L. *sturĭō;* Ger. *stör;* AS. *styria*, a sturgeon], (*Accipenser*): Linnæan genus of cartilaginous fishes, now forming the family *Sturionidæ*, and placed by Müller in the order of *Ganoids*, distinguished by the Ganoid (q.v.) scales or bony shields which form the external covering. The gills are free, as in osseous fishes. The vertebral column is soft; and there are no evident sutures in the skull. Reproduction is by roe, as in osseous fishes. The form is elongated and angular; the plates are

in regular rows; the head is cuirassed; snout long and conical; mouth is on the under surface of the head, tubular, protractile, and without teeth. The upper lobe of the tail is much larger than the under. The dorsal and anal fins are opposite to one another, behind the ventrals. The air-bladder is very large, and communicates with the gullet by a large hole. The species are numerous, and inhabit both the sea and fresh water, ascending deep muddy rivers at certain seasons, and temporarily inhabiting lakes. Numerous species are found in northern parts of the world, though there are none in the Arctic Ocean, or the rivers which flow into it; but the south of Siberia and N. America abound in them. They are plentiful in the Caspian and Black seas, and in the rivers connected with them, where the S. fishery is of great importance, supplying the inhabitants of large districts with their chief subsistence, and producing great quantities of Caviare (q.v.), or preserved S. roe, and of isinglass (see GELATIN), for sale. About 20 species are known.—The Common S. (*A. sturio*) of Europe is a large



Sturgeon (*Accipenser sturio*).

fish, six or eight ft. in length, with five rows of flattened plates; muzzle long and pointed. Another species (*A. latirostris*) has broader muzzle. The S. was in very high repute for the table among the Greeks and Romans, at whose banquets it was introduced with particular ceremonies. In England, when caught in the Thames above London Bridge, it is a *royal* fish, and can be claimed by the sovereign. Its flesh is white, delicate, and firm. It is used both fresh (generally stewed) and pickled or salted.—The largest species is the Bielaga, or Huso (*A. huso*), of the Black and Caspian seas and their rivers. It attains 20 or 25 ft. length, and has been known to weigh nearly 3,000 lbs. Great part of the caviare of commerce is made from it, and much isinglass, which is merely the air-bladder washed, cut into strips, and dried. The Sterlet (*A. ruthenus*) is only about three ft. in length, found in the same regions. There are several other European and Asiatic species.

On our Atlantic coast, the most common species, the Sharp-nosed S. (*A. oxyrhynchus*) is now regarded as identical

with *A. sturio* of Europe. Another marine species, not yet found n. of Cape Cod, is the Short-nosed Sturgeon (*A. brevirostris*); the beak is much shorter and blunter, the head high and regularly convex; the dorsal plates begin as far back as the pectoral fins, and their apexes do not present a sharply serrate profile. Both species ascend large rivers in summer, and have been utilized by curing in smoke, and the manufacture of caviare from the eggs; the flesh is red, and has been called 'Albany beef.'—The Lake Sturgeon (*A. rubicundus*), of the Great Lakes and Mississippi valley rivers, averages 5 ft. in length, the fins reddish, and has the general outline of the Common Sturgeon, with the lateral plates larger and semi-lunar, instead of irregularly rhombic. The French Canadians prepare a *bouillon* from the fresh meat, skimming off the oil, and it is much like chicken-soup. At Sandusky, O., the sturgeon is smoked in large quantities, the spawn made into caviare, the bladders into isinglass, and the rest boiled for oil.—The White Sturgeon (*A. transmontanus*) is the common one of the Pacific coast and its large rivers, attaining 8-10 ft. length, abundant in the San Francisco market, and utilized like the eastern species.—A rarer species of the same range is the Green Sturgeon (*A. medirostris*), reputed poisonous as food, but whether justly has not been made certain.—The Shovel-nosed Sturgeon (*Scaphirhynchops platyrhynchus*) of the large rivers of the west and south differs remarkably from the preceding, as its name indicates; also in the slender elongation of the body between the dorsal and caudal fins, and the long, whip-like elongation of the upper lobe of the latter. It is much used for food on the Ohio, but not much valued.—The food of sturgeons is mostly shell-fish; the flesh has little of the taste of fish, and by proper modes of cooking is palatable.

STURGEON, William: English physicist: b. Whittington, Lancashire, 1783, May 22; d. 1850, Dec. 4. His education was begun in the army, where he received through the aid of his officers instruction in Latin, Greek, and mathematics, which enabled him to read scientific books and to follow in particular his desire for a knowledge of electricity. His experiments begun during this period attracted attention on his settlement in Woolwich as a private citizen, and in 1823 he became widely known for his experiments with Ampère's rotary cylinders, and in the same year constructed the first soft iron electro-magnet. In 1832 he developed a machine which produced the greatest electric current then known, and during the remainder of his life was engaged in many valuable experiments. His chief writings are included in his *Scientific Researches* (1850).

STURGEON BAY: Wis.; city, county-seat of Door co.; on Sturgeon Bay, and on the canal which connects Green Bay with Lake Michigan by a short route. It is

about 40 m. n.e. of the city of Green Bay. The bay is a good harbor about 8 m. long and from 1 to 3 m. wide. The city is in an agricultural region, formerly an extensive lumbering region. There is a large amount of lumbering. Sturgeon Bay exports large quantities of grain and lumber. It has one state bank with a capital of $25,000, and one private bank. Pop. 3,500.

STURGES, *stĕr'jĕs*, JONATHAN: merchant: 1802, Mar. 24—1874, Nov. 28; b. Southport, Conn. In 1821 he went to New York, and engaged as clerk in a mercantile house; 1828 became its junior, and 1836 its senior partner; retiring 1868. He was one of the founders of the Union League Club, and at one time vice-president of the New York Chamber of Commerce; was an earnest advocate of municipal reform, and strongly opposed the Tweed ring; a liberal patron of art; and gave freely to worthy charities. He died in New York.

STURGIS, RUSSELL: American architect and author: b. Baltimore, Md., 1836, Oct. 16; d. 1909, Feb. 10. He was graduated at the College of the City of New York in 1856; studied architecture in Europe, and practised his profession 1865-78, retiring because of failing health. He devoted his attention to the artist societies of New York city and to writing and lecturing on art subjects. He edited the art sections of the *Century* and Webster's *International* dictionaries, and of Johnson's (now Appleton's) *Universal Cyclopedia;* contributed largely also to the *New International Encyclopædia* and the *Encyclopedia Americana.* Was editor and chief author of the *Dictionary of Architecture and Building* (1901-2), and edited the department 'The Field of Art' in *Scribner's Magazine* from 1898, Jan.; issued a revised edition of Lübke's *Outlines of the History of Art,* very completely revised and brought down to date (1904). He is the author of *European Architecture, a Historical Study* (1896); *Annotated Bibliography of Fine Art* (1897); *How to Judge Architecture* (1903); *The Appreciation of Sculpture* (1904); *The Interdependence of the Arts of Design—the Scammon Lectures for 1904* (1905); numerous critical monographs in different periodicals.

STURGIS, SAMUEL DAVIS: soldier: 1822, June 11—1889, Sept. 28; b. Shippensburg, Pa. He graduated at West Point 1846, and was assigned to the 2d dragoons; served through the Mexican war, and afterward on the frontiers. At the beginning of the civil war Sturgis was in command of Ft. Smith, Ark.; and, to prevent the capture of soldiers and government property, he evacuated it without waiting for orders, and took his command to Ft. Leavenworth, Kan. 1861, May 3, he was commissioned major of the 4th cavalry, and served under Gen. Lyon, succeeding that officer at his death at the battle of Wilson's Creek, Aug. 10. He was made brigadier-general of volunteers from that date, and assigned to the army of Tennessee, subsequently to the department of

Kansas. In 1862 he was transferred to the eastern department; was engaged at Antietam, South Mountain, and Fredericksburg. 1865, Mar. 13, he was brevetted brigadier-general and major-general U. S. army. He died at St. Paul, Minn.

STURIONIAN, a. *stū'rĭ-ō'nĭ-ăn:* pertaining to the sturgeon family of fishes.

STURLUSON, *stôr'lŭ-sŏn,* SNORRI: Icelandic author and politician: b. 1178; d. Reykholt, 1241, Sept. 22. He was well educated in Scandinavian history, mythology, and poetry. He soon rendered himself popular by his bravery on the field, and eloquence in the assemblies of the people, and was elected by the unanimous voice of the people supreme judge of the island. In 1213 he composed his first poem, which became widely known, a panegyric of Hako IV., king of Norway. In 1218 he paid a visit to Norway, where he was well received by Jarl Skule, who loaded him with rich presents and high dignities on the eve of his return to Iceland in 1220. In 1237, being forced by feuds to leave Iceland, he made a second voyage to Norway, where he was once more warmly welcomed by Skule, now become duke. Snorri composed some poetical pieces warmly laudatory of his patron, and promising him success in the struggle going on between him and Hako V. That prince forbade Snorri to return to his native land, but the order was unheeded, and Sturluson, being informed of the decline of the power of his enemies, returned to Iceland in 1239, and was there murdered. His principal work, which he completed about 1230, is the *Heimskringla* (Circle of the World), in which he records the lives of the legendary and historical kings of Norway down to the death of Magnus Erlingsson in 1177. It was translated into Danish by Peder Clausson, and published in Copenhagen by Olaf Worm in 1633. A recent edition is that by Jónson (1893 onward). The work has also been translated into German, Norwegian, Swedish, Latin, and English (by S. Laing, 1844; new edition by R. B. Anderson, 1889; by W. Morris and E. Magnússon, 1893-4). He composed numerous eulogistic poems on the princes and jarls whose courts he had visited; and wrote, it is believed, the first part (*Gylfa-Ginning*) of the *Snorra-Edda,* or *Younger Edda.*

STURM, *stôrm,* JOHANNES: German educator: b. 1507, Oct. 1; d. 1589, Mar. 3. In 1537 he founded the gymnasium in Strasburg which attained worldwide celebrity. He was generally regarded as the greatest educator connected with the Reformed Church. Sturm's ideal in education was 'to direct the aspiration of the scholars towards God, to develop their intelligence, and to render them useful citizens by teaching them the skill to communicate their thoughts and sentiments with persuasive effect.' In carrying out this ideal Sturm showed his superiority by his judicious gradation of the course of

study, and by his novel and attractive methods of instruction.

STURM, JULIUS: German lyric poet: b. Köstritz in Reuss, 1816, July 21; d. 1896, May 2. He studied theology at Jena and was pastor at Göschitz 1851-7, and at Köstritz 1857-85. Among his published volumes are: *Two Roses; or, the Canticle of Love* (1854); *Devout Songs and Poems* (1858); *Israelite Songs* (3d ed., 1881); *Poems of Battle and Victory* (1870); *Mirror of the Time in Fables* (1872); *To the Lord my Song* (1884); *Palm and Crown* (1887); *In Joy and in Sorrow* (1896).

STURTEVANT, *stėr'tė-vant,* JULIAN MONSON, D.D., LL.D.: 1805, July 26—1886, Feb. 11; b. Warren, Conn.: educator and author. Graduated at Yale 1826, and its Divinity School 1829; he was thereafter connected with Illinois College, at Jacksonville, Ill., as tutor 1829-30; professor of mathematics, natural philosophy, and astronomy 1831-34; president and professor of mental and moral philosophy 1844-76; and professor of mental science and science of government until his death. His service in all departments was of a high order. Besides many occasional papers, he published *Economics, or the Science of Wealth* (1878), a unique work that aims to define rigidity, and to develop logically, the whole subject from the principle of individual ownership. He also was author of *Keys of Sect, or the Churches of the New Testament* (1879). As writer and educator he was distinguished for spiritual fervor and for broad and progressive thought.

STUTTER, v. *stŭt'tėr* [Low Ger. *stötern;* Ger. *stottern,* to stutter: Swiss, *dudern,* to stammer: Icel. *stauta,* to read stutteringly]: to speak imperfectly with broken efforts of the voice; to hesitate in uttering words; to stammer (see STAMMER): N. hesitation in speaking; the broken efforts of the voice in imperfect speech. STUT'TERING, imp.: ADJ. hesitating; stammering: N. act of stammering. STUT'TERED, pp. *-tėrd.* STUT'TERER, n. *-tėr-ėr,* one who hesitates or stammers in uttering words. STUT'TERINGLY, ad. *-lĭ.*

STUTTERING. See STAMMERING.

STUTTGART, *stôt'gârt:* Germany; capital of Würtemberg, in the basin of a broad valley, enclosed by vine-clad or wooded hills, near the Neckar, 40 m. s.e. of Carlsruhe. Many of the important buildings are grouped near the central Palace Square; chief of these are the old and new Schlösser or Palaces, of the 16th and 17th-18th centuries, respectively, with extensive and beautiful grounds, embellished by statuary and fountains. Other interesting features are the numerous princely palaces; the Königsbau, with colonnades; Akademie; the gothic churches of St. Leonards, St. John, and the Hospital Church; the Queen Olga buildings, on the n. side of Castle Square, the National Industrial Museum, with

lofty cupolas; the Liederhalle, containing an enormous hall; the new town hall, Peace Church, St. Nicholas, etc. Other interesting features are the numerous collections of antiquities, art, numismatics, archives, conservatory of music, chemical laboratory, schools of art, science and commerce; and the magnificent royal library, which contains about 500,000 volumes, and the largest collection of Bibles in the world (7,300). Stuttgart is one of the most important publishing centers in the world and has a constantly increasing trade. The manufactures include textiles, chemicals, furniture, chocolate, pianos, pigments, leather, etc. Near the Neckar, at Berg, there are mineral springs, and Carnstatt is a watering-place near the town, connected with it by tramway. Many monuments of German heroes and celebrities stand in the various squares of the city and in the parks. The town is on the line of several railways, and is much frequented by Americans and English. It stands on the site of an ancient monastery. In the 15th c. it became the residence of German princes and was greatly improved. Art and science were introduced in the 19th c. Stuttgart is the home of the philosopher Hegel and Hauff the art critic. Pop. (1900) 181,463.

STUYVESANT, *stī'vĕ-sănt*, PETRUS: Dutch director-general of New Netherland: b. Holland, 1602; d. New York, 1682. He served in the war in the West Indies, became director of the colony of Curaçao, and, having lost a leg in an unsuccessful attack on the Portuguese island of St. Martin, returned to Holland in 1644. In 1645 he was appointed by the Dutch West India Company director-general of New Netherland, succeeding William Kieft, who had involved the settlers in a war with the Indians, and created general disorder. He did not arrive until 1647, May 11, when he commenced a vigorous and often arbitrary administration, conciliating the savages and thoroughly restoring order. In 1650 he arranged at Hartford with the New England commissioners a boundary between the Dutch and English territories, previously undefined and a cause of frequent disputes. He was also involved in trouble with the Swedes on the south. In 1651 the Dutch built Fort Casimir on the Delaware, but the post was captured by Rising, governor of New Sweden, in 1654. To revenge this, Stuyvesant in 1655, with seven vessels and about 700 men, sailed into the Delaware, and made a conquest of the whole settlement of New Sweden, calling it New Amstel. Ten years of peace followed, disturbed only by the growing jealousy of the English, and by the civil discontents which the haughty character of Stuyvesant's administration provoked. In 1653 a convention of the people, consisting of two deputies from each village in New Netherland, met and formulated demands that 'no new law shall be enacted but with the consent of the people; that none shall be appointed to office but with the approbation of

the people; that obscure and obsolete laws shall never be revived.' This assembly was dissolved by Stuyvesant, who commanded the members to disperse, saying: 'We derive our authority from God and the company, not from a few ignorant subjects.' The encroachments of the New England colonies at last induced Stuyvesant himself to lay his remonstrances before the convention of the united colonies at Boston, but he met with little favor. A second embassy to Hartford had no better success. The Connecticut agents made exorbitant claims to territory by virtue of the royal patent. In 1664 Charles II. granted to his brother, the duke of York, the territory from the Connecticut to the shores of the Delaware, and in August an English fleet under Captain Richard Nicholls appeared in the bay and demanded the surrender of the city. The municipality insisted on yielding. After holding out for a short time, the governor at last consented, and the city was surrendered 1664, Sept. 3. After the capture Stuyvesant in 1665 left to report to his superiors in Holland, but afterward returned, spending the remainder of his life on his farm or bouwerij (whence the name of the street called Bowery). He lies buried in the vaults of St. Mark's Church. The semi-burlesque account of him by Irving in the *Knickerbocker's History* is well known.

STY, v. *stī* [AS. *stigan,* to climb, rise]: in *OE.,* to climb upward; to soar; to ascend. STY'ING, imp. STIED, pp. *stīd.*

STY, n. *stī,* STIES, n. plu. *stīz* [Icel. *stí;* Dan. *sti;* Sw. *stia,* a sty]: an inclosure for swine; any place extremely filthy; in *OE.,* a place of bestial debauchery: V. to shut up in a sty. STY'ING, imp: STIED, pp. *stīd.*

STY, n., or STYE, n. *stī* [Norw. *stī, stigje;* Low Ger. *stieg,* a pustule at the corner of the eye]: popular name for Hordeolum, a minute inflammatory swelling or boil on the edge of the eyelid. It begins as a small, red, tense swelling, accompanied with considerable itching and a feeling of stiffness. As the inflammation goes on, the lid may become so swollen as to keep the eye closed. In a few days, matter forms; a white point appears at the apex of the swelling; and when the cuticle gives way, pus and a small slough of connective tissue escape, after which there is a general remission of the symptoms, and the eyelid soon resumes its natural state.—This common affection is chiefly confined to scrofulous and delicate children, though occurring sometimes in persons of more advanced age. The best local treatment is application of warm-water dressings with lint and oiled silk; and if any hardness remains after discharge of the matter, dilute nitrate of mercury ointment may be applied. The sty should never be rubbed (notwithstanding the common prejudice in favor of rubbing it with a gold ring), nor, in general, is it necessary to puncture it. To prevent recurrence, attention should be given to the diet, which

PETER STUYVESANT.

should be abundant and nourishing, to the state of the bowels, and to the general health; and tonics may usually be prescribed with advantage. Especially necessary is it for those subject to styes to have the sight tested, for the trouble is often due to eyestrain. The old form of the word was *stian.*

STYGIAN, a. *stĭj'ĭ-ăn* [L. *Styx;* Gr. *Stux,* a river in the infernal regions by which the gods swore]: pertaining to Styx; hellish; infernal. See STYX.

STYLAGALMAIC, a. *stī'lă-găl-mā'ĭk* [Gr. *stulos,* a pillar, a column; *agalma,* an image]: in *arch.,* applied to figures performing the office of columns.

STYLE, n. *stīl* [F. *style,* style—from L. *stylus,* a stake, a pale, a style for writing]: distinctive manner of writing in regard to the use of language and the choice of words; phraseology; manner of speaking; peculiar mode of expression and execution, as style of architecture, painting, music, etc.; formal address; title; appellation; particular mode in conducting proceedings, as in a court of justice; mode; manner; fashion; among the *ancients,* a pointed instrument of bronze or iron for writing on tablets covered with wax; the pin of a dial which projects the shadow; in *bot.,* the stalk interposed between the ovary and the stigma: V. to call; to name; to designate. STY'LING, imp. naming; denominating. STYLED, pp. *stīld.* STYLAR, a. *stī'lẹr,* pertaining to the gnomon of a dial. STY'LATE, a. *-lāt,* or STY'LIFORM, a. *-lĭ-fawrm* [L. *forma,* shape]: resembling a style or pen; pointed. STY'LET, n. *-lĕt,* a small-pointed poniard or dagger. STY'LISH, a. *-lĭsh,* showy; fashionable. STY'LISHLY, ad. *-lĭ.* STY'LITE, n. *-līt,* in *anc. times,* one of a class of religious enthusiasts who took up their abodes on the tops of columns or pillars (see PILLAR SAINTS). STYLE OF COURT, the practice observed by a court in its proceedings. NEW STYLE: see under NEW. OLD STYLE: see under OLD (also, see CALENDAR).—SYN. of 'style, v.': to denominate; call; term; characterize;—of 'style, n.': diction; manner; course; way; mode.

STYLO-, prefix, *stīl-ō* [Gr. *stulos,* a pillar, a post]: pillar-like; having processes or projections resembling small pillars; in *anat.,* of, belonging to, or attached to the styloid process of the temporal bone.

STYLOBATE, n. *stī'lō-bāt* [Gr. *stulos,* a pillar; *bătēs,* one that treads—from *bainō,* I walk]: in *arch.,* any basement or substructure (e.g., of a temple) upholding columns above the ground; sometimes continuous all round the peristyle in the form of three high steps: sometimes it resembles a continuous pedestal along each side, with flights of steps at either end.

STYLOGRAPHY, n. *stī-lŏg'ră-fĭ* [L. *stylus,* a stake, a style, and Gr. *graphō,* I write]: the art or mode of tracing lines with a pointed instrument on cards or tablets. STY'LOGRAPH'IC, a. *-lō-grăf'ĭk,* pertaining to. STY'-

LOGRAPH'ICALLY, ad. *-ĭ-kăl-lĭ.* STY'LOID, a. *-loyd* [Gr. *eidos,* resemblance]: having some resemblance to a style or pen; in *anat.,* applied to a process of the temporal bone.

STYLONURUS, n. *stī'lō-nū'rŭs* [Gr. *stulos,* a stake, a style; *oura,* the tail]: in *geol.,* a crustacean of the lower Old Red Sandstone, of the family *Eurypteridæ.*

STYLOPOD, n. *stī'lō-pŏd,* or STYLOPO'DIUM, n. *-dĭ-ŭm* [Gr. *stulos,* a stake, a post; *pous* or *poda,* a foot]: in *bot.,* a fleshy disk at the base of the styles of the Umbelliferæ.

STYPHNIC ACID, *stĭf'nĭk:* a substance produced by the action of nitric acid on asafetida.

STYPTIC, n. *stĭp'tĭk* [L. *styp'tĭcus;* Gr. *stup'tĭkos,* astringent—from Gr. *stuphō,* I contract: F. *styptique*]: in *med.,* a substance which checks local bleeding, by application to the bleeding orifice or surface (see BLEEDING): ADJ. astringent; having the property of restraining bleeding. STYPTICITY, n. *stĭp-tĭs'ĭ-tĭ,* the quality of being astringent.

STY'RAX: the typical genus of the order *Styraceæ,* graceful, spreading shrubs or trees, with entire or serrate leaves, and bearing white five-merous flowers in drooping racemes, often very showy and fragrant. *Styrax benzoin* of the East Indies and adjacent Asiatic coasts, yields, when the bark is wounded, a yellowish-brown resin, which, when heated or rubbed, gives out a balsamic vanilla-like odor. *Styrax officinalis,* found in Asia Minor and Syria, has a resinous bark and flowers of orange-blossom-like sweetness. This species formerly yielded the fragrant solid resin, vanilla-scented, and like benzoin, known as storax, once much used in incense, but which has now disappeared from commerce, its place being taken by the 'liquid' storax, furnished by *Liquid-ambar,* and which also was anciently known. *Styrax Americana* is a small shrub, of the southern United States, which has slender branches, and, in spring, drooping solitary or racemed, bell-shaped flowers, having a faint fragrance, and nearly hidden by the small, oval leaves which are nearly smooth. *S. grandifolia* is more pubescent, has larger leaves and more fragrant flowers. Certain Japanese species are in cultivation, and are hardy as far north as Massachusetts, such as *S. Japonica* and *S. obassia.*

STYRACINE, or STYRACIN, n. *stī'ră-sĭn* [L. *styrax;* Gr. *sturax,* storax]: a crystalline substance obtained from storax.

STYRIA, *stĭr'ĭ-â* (Ger. *Steiermark*): duchy, one of the crown-lands of Austria, in the Cis-Leithan part of the Austrian empire; bounded n. by Upper and Lower Austria, e. by Hungary and Croatia, s. and w. by Carniola, Carinthia, and Salzburg; area 8,671 sq.m. Styria is mountainous, traversed in the w. and center by branches

of the Noric Alps, which spread into numerous ramifications; while the s. portion, between the Drave and the Save is occupied by branches of the Carnic Alps. The climate, like that of most mountainous countries, is variable; but is generally raw and cold in the n. and more mountainous portion, and mild in the south. But in spite of its physical character, agriculture is so zealously prosecuted that seven-eighths of the country is under cultivation, producing rye, wheat, oats, and maize. Vines are largely cultivated in various parts, and orchards are numerous. The chief wealth of the country, however, is in its mineral products, which include immense quantities of iron, besides lead, copper, gold, silver, marble, limestone, and slate, with abundance of salt and coal. The chief industries are thus connected with production of iron and steel, and their manufacture into articles of such excellent quality as to be in great demand in other countries. There are manufactures also of brass and lead articles, earthenware, paper, tobacco, glass, white lead, copper-hammers, and of cotton, linen, cloth, etc.—Styria was anciently divided between Noricum and Pannonia, and has generally followed the fortunes of the two provinces of Upper and Lower Austria. The Reformation was early and generally welcomed in Styria; but the dukes mercilessly repressed it, offering their subjects the alternative of renunciation or of exile: 30,000 Protestants chose exile. Religious liberty was not given till a little more than a century ago. Pop. (1900) 1,356,494.

STYRIAN, n. *stĭr'ĭ-ăn:* native of *Styria,* in Austria: ADJ. pertaining to.

STYROLE, n. *stī'rōl* [L. *styrax,* storax; *olĕum,* oil]: a peculiar oily substance obtained from liquid storax.

STYTHE, n. *stīth:* a miner's term for the stifling, suffocating odor of choke-damp that follows an explosion of fire-damp.

STYX, *stĭks* [literally, 'the Hateful,' from Gr. *stug-,* to hate, abhor]: in historical times, a waterfall in Greece, near the town of Nonacris, in n.e. Arcadia; descending perpendicularly over lofty and precipitous rocks, and forming a small torrent which falls into the Akrata (anc. Crathis). The scenery around is weird and desolate, so that the ancient Greeks regarded the Styx with superstitious awe, the water being supposed to be poisonous, and to break every vessel into which it was put, except those made of the hoof of a horse or an ass. It was reported that Alexander the Great had been poisoned by it. It is now called *ta Mauraneria* (the Black Waters), and also *ta Drakoneria* (the Terrible Waters)—the belief in its poisonous qualities still surviving.—In *mythology* (in Homer), the Styx was one of the rivers of Hades, round which it flowed seven times, and over which Charon (q.v.) conveyed the shades of the departed: hence the name was applied sometimes to the

infernal regions. As a goddess (in Hesiod), Styx was daughter of Oceanus and Tethys, dwelling in a grotto at the entrance of Hades: the most solemn oaths of the gods were taken in her name, even as the ancient Arcadians used to swear on important occasions by the waters of the river Styx.

SUA'BIA. See SWABIA.

SUABLE, a. *sū'ă-bl.* See under SUE.

SUAKIN, *swâ'kĭn:* Nubia; a seaport on the coast of the Red Sea, consisting of two parts joined by a causeway, one part occupying the shore of the mainland, the other the rocky island in the bay. It is the principal town of the district of the same name, in the Sudan. The natives live at El-Keff, the section on the mainland, and here stands the bazaar—a scene of bustling activity, also the barracks occupied by Anglo-Egyptian troops; beyond are the fountains surrounded by date-groves and orchards. The natives live in tents. The principal manufactures are silver ornaments, knives, spear-heads, and leather-work. Trade is considerable, and the chief exports include the above-mentioned articles, besides ivory, gums, millet, cattle, hides, and gold. The imports: durra, cottons, flour, sugar, rice, ghi, dates, and coal. This is a starting-point for pilgrimages to Mecca. The vicinity was the battlefield of the allied British and Egyptian forces against the Mahdi and his Dervish followers. Pop. 15,713.

SUAREZ, FRANCISCO: Spanish theologian: b. Granada, 1548; d. Lisbon, 1617. He was one of the most eminent scholastic and polemical writers of the Roman Catholic Church. He entered the society of Jesuits in 1564, and soon became professor in succession at Valladolid, Rome, Alcalá, and Salamanca. In 1597 Philip II. appointed him principal professor of divinity at the University of Coimbra, a position he held until his death. The most recent edition of his works was published in Paris in 1860.

SUASION, n. *swā'zhŭn* [L. *suāsus,* advised, exhorted; *suadĕō,* I advise]: act of persuading or advising. SUA'SIVE, a. *-zĭv,* having the power to persuade. SUA'SIVELY, ad. *-lĭ.*

SUAVE, a. *swâv* [F. *suave*—from L. *suāvĭs,* sweet; pleasant in manner; agreeable; bland. SUAVITY, n. *swáv'-ĭ-tĭ* [F. *suavité*—from L. *suavĭtātem,* pleasantness]: agreeableness of manners; pleasantness; urbanity.

SUB, *sŭb* [L.]: a prefix signifying 'under' or 'below;' beneath: *sub* denotes a less or inferior degree, or an imperfect state, of the quality expressed by the word before which it is placed: for the sake of euphony, the *b* in *sub* becomes *c, f, g, m, p,* or *s,* according to the first letter of the other part of the word, as in *succeed, suffer, suggest, summon, supplant, sustain:* N. in *familiar language,* a subordinate; one lower in rank.

SUBACID, a. *sŭb-ăs'ĭd* [L. *sub,* under, and *acid*]: moderately acid or sour: N. a substance moderately acid or sour: N. a substance moderately acid.

SUBACRID, a. *sŭb-ăk'rĭd* [L. *sub, under,* and *acrid*]: moderately pungent or acrid.

SUBACUTE, a. *sŭb'ă-kūt* [L. *sub,* under, and *acute*] acute in a moderate degree.

SUBAERIAL, a. *sŭb'ā-ē'rĭ-ăl* [L. *sub,* under, and *aerial*]: beneath the sky; in the open air.

SUBAGENT, n. *sŭb-ā'jĕnt* [L. *sub,* under, and *agent*]: a person employed by an agent to transact a part of his business.

SUBAH, n. *sô'bâ* [Pers. and Hind.]: province or viceroyship. SUBAHDAR, or SOUBAHDAR, n. *sô'bâ-dâr* [Pers. *subah,* a province; *dâr,* holding, keeping]: under the old Mogul govt., a viceroy or gov. of a province; now in *India,* native officer with rank equivalent to a European captain. SU'BAHSHIP, n. jurisdiction of a subahdar. SUBAHDAR MAJOR, native commandant of a native infantry regiment.

SUBALTERN, n. *sŭb'ăl-tėrn* [F. *subalterne*—from mid. L. *subalter'nus,* subordinate—from L. *sub,* under; *alter,* another: It. *subalterno*]: commissioned company officer in a regt. under the rank of capt.—i.e., a lieut.: ADJ. inferior; subordinate. SUBALTERN PROPOSITIONS, in *logic,* universal and particular propositions agreeing in quality, but not in quantity.

SUBALTERNATE, a. *sŭb-ăl-tėr'nāt* [L. *sub,* under, and *alternate*]: successive; succeeding by turns; subordinate: in *logic,* a particular as opposed to a universal. SUBAL-TERN'ANT, n. *tėrn'ant,* in *logic,* a universal as opposed to a particular proposition. SUB'ALTERNA'TION, n. *-tėr-nā'shŭn,* succession by course: state of inferiority.

SUBANGULAR, a. *sŭb-ăng'gū-lėr* [L. *sub,* under, and *angular*]: slightly angular.

SUB-APENNINES, n. plu. *sŭb-ăp'ĕ-nīns* [L. *sub,* under, and *Apennines*]: in *geol.,* an extensive series of older and newer Pliocene beds which are amply developed along the whole extent of Italy on both flanks of the Apennines, and which form a line of low hills between the older chain and the sea.

SUBAQUEOUS, a. *sŭb-ā'kwĕ-ŭs,* or SUBAQUATIC, a. *sŭb'ă-kwăt'ĭk* [L. *sub,* under, and *aqueous,* or *aquatic*]: being or lying under water; formed in or under water.

SUBASTRINGENT, a. *sŭb'ăs-trĭn'jĕnt* [L. *sub,* under, and *astringent*]: astringent in a small degree.

SUBAXILLARY, a. *sŭb-ăks'ĭl-ėr-ĭ* [L. *sub,* under, and *axillary*]: in *bot.,* placed under the axil or angle formed by a branch or leaf with a branch or stem.

SUB-BASE, n. *sŭb'bās* [L. *sub,* under, and *base*]: in

music, the deepest pedal stop, or the lowest notes, of an organ.

SUBCALCAREOUS, a. *sŭb-kăl-kā'rĭ-ŭs* [L. *sub*, under, and *calcareous*]: somewhat calcareous.

SUBCARTILAGINOUS, a. *sŭb-kâr'tĭ-lăj'ĭ-nŭs* [L. *sub*, under, and *cartilaginous*]: partially cartilaginous; under the cartilages of the chest.

SUBCAUDAL, a. *sŭb-kaw'dăl* [L. *sub*, under, and *caudal*]: beneath the tail.

SUBCENTRAL, a. *sŭb-sĕn'trăl* [L. *sub*, under, and *central*]: nearly central but not quite.

SUBCLASS, n. *sŭb'klas* [L. *sub*, under, and *class*]: a subordinate class, consisting of orders allied to a certain extent.

SUBCLAVIAN, a. *sŭb-klā'vĭ-ăn* [L. *sub*, under; *clāvis*, a key]: in *anat.*, applied to an artery and muscle lying under the collar-bone.

SUBCOLUMNAR, a. *sŭb'kō-lŭm'nėr* [L. *sub*, under, and *columnar*]: in *geol.*, not perfectly columnar.

SUBCOMMITTEE, n. *sŭb'kŏm-mĭt'tē* [L. *sub*, under, and *committee*]: an under or smaller committee.

SUBCONICAL, a. *sŭb-kŏn'ĭ-kăl* [L. *sub*, under, and *conical*]: conical in a slight degree.

SUBCONSCIOUS [from Lat. *sub*, under, *cum*, together, and *scire*, to know]. There is great diversity in the use of this term both in psychology and metaphysics. In a symposium on the subject in *The Journal of Abnormal Psychology*, II., Nos. 1 and 2, the following six current views are stated:

(1) That portion of our field of consciousness which, at any given moment, is outside of the focus of attention; hence, the fringe or margin of consciousness, a diminished or partial awareness.

(2) A secondary consciousness which exists within, or at the side of, the primary consciousness. The subconscious ideas are 'dissociated' or split off from the primary consciousness so that the subject is entirely unaware of them, although they are not inert but active.

(3) A synthesis of dissociated states of consciousness into a self-conscious personality which is spoken of as the subconscious self. Every mind has two selves; the secondary self often plays important and independent rôles.

(4) The active dissociated states (2, above) in addition to the potential memories of past experiences, now forgotten.

(5) A subconscious self, which is the main source of the conscious self. We are conscious of but little in comparison with the vast storage of 'subliminal ideas.' (The doctrine of Myers.)

(6) A physiological interpretation of what is com-

monly attributed to dissociated ideas; synonymous with one use of unconscious (q.v.) and equivalent to unconscious cerebration (q.v.).

SUBCONTRACT, n. *sŭb-kŏn'trăkt* [L. *sub*, under, and *contract*]: a contract taken under a previous contract. SUB'CONTRAC'TED, a. *-trăk'tĕd*, contracted after a former contract.

SUBCONTRARY, a. *sŭb-kŏn'tră-rĭ* [L. *sub*, under, and *contrary*]: contrary in an inferior degree; in *geom.*, applied to similar triangles having a common angle at the vertex while the bases do not coincide; in *logic*, applied to propositions which agree in quantity but differ in quality.

SUBCORDATE, a. *sŭb-kŏr'dāt* [L. *sub*, under, and *cordate*]: somewhat like a heart in shape.

SUBCOSTAL, a. *sŭb-kŏs'tăl* [L. *sub*, under, and *costal*], under or internal to a rib.

SUBCUTANEOUS, a. *sŭb'kū-tā'nĕ-ŭs* [L. *sub*, under, and *cutaneous*]: immediately under the skin.

SUBCUTICULAR, a. *sŭb'kū-tĭk'ŭ-lėr* [L. *sub*, under, and *cuticular*]: under the cuticle or scarfskin.

SUBDEACON, n. *sŭb-dē'kn* [L. *sub*, under, and *deacon*]: an under-deacon or deacon's assistant: in *chh. hist.*, lowest rank in holy orders in the Roman Church; highest of the minor orders among the Greeks. In the Roman Church, subdeacons prepare the sacred vessels and the bread and wine for mass, pour the water into the chalice at the offertory, and sing the Epistle. There are no subdeacons in the Anglican Church.

SUBDEAN, n. *sŭb'dēn* [L. *sub*, under, and *dean*]: an under-dean; a dean's substitute. SUBDEAN'ERY, n. *-ėr-ĭ*, the office and rank of subdean.

SUBDIVIDE, v. *sŭb'dĭ-vīd'* [L. *sub*, under, and *divide*]: to divide into smaller parts; to separate into smaller divisions. SUB'DIVI'SION, *n. -vĭzh'ŭn*, the part of a larger part.

SUBDOMINANT, n. *sŭb-dŏm'ĭ-nănt* [L. *sub*, under, and *dominant*], in Music: note below the dominant, the fifth below the key-note; the note whose dominant is the tonic. Thus F is the subdominant of C, and C of G. One of the keys most nearly related to any key is its subdominant; and the easiest of all modulations is that from a key to its subdominant, which is effected by adding the dominant seventh to the common chord, and the resolution of this chord is the common chord of the subdominant. See DOMINANT.

SUBDUCE, v. *sŭb-dūs'*, or SUBDUCT, v. *sŭbdŭkt'* [L. *sub*, under; *ductus*, pp. of *duco*, I lead]: to withdraw; to subtract. SUBDU'CING, imp. SUBDUCED', pp. *-dūst'*. SUBDUC'TION, n. *-dŭk'shŭn*, the act of taking away or withdrawing.

SUBDUE, v. *sŭb-dū'* [OF. *subduzer,* to subdue—from L. *sub,* under; *ducĕrĕ,* to lead]: to conquer by force or superior power; to reduce under dominion; to disable from further resistance; to tame; to overcome; to soften. SUBDU'ING, imp. SUBDUED', pp. *-dūd'.* SUBDU'ER, n. *-dū'ĕr,* one who subdues. SUBDU'AL, n. *-ăl,* the act of subduing; conquest. SUBDU'ABLE, a. *-ă-bl,* that may be subdued.—SYN. of 'subdue': to conquer; overpower; surmount; vanquish; subjugate.

SUBDUPLICATE, a. *sŭb-dū'plĭ-kāt* [L. *sub,* under, and *duplicate*]: having the ratio of the square roots; in *math.,* applied to the ratio which the square roots of two quantities have to each other.

SUBEDITOR, n. *sŭb-ĕd'ĭ-tėr* [L. *sub,* under, and *editor*]: an assistant-editor; an under-editor.

SUBERATE, n. *sū'bėr-āt* [L. *sūber,* the cork-tree]: in *chem.,* a salt formed by suberic acid with a base. SUBERIC, a. *sū-bĕr'ĭk,* pertaining to cork; applied to an acid produced by the action of nitric acid on cork and fatty bodies. SUBERIN, n. *sū'bėr-ĭn,* the cellular tissue of cork purified. SU'BEROUS, a. *-ŭs,* or SU'BEROSE, a. *-ōz,* in *bot.,* having a corky texture.

SUBFUSK, or SUBFUSC, a. *sŭb-fŭsk'* [L. *sub,* under; *fuscus,* dark, dusky]: having a brownish color; in *Oxford Univ. slang,* dull in color, as clothes.

SUBGENUS, n. *sŭb-jē'nŭs* [L. *sub,* under, and *genus,* race, stock]: a subordinate genus comprehending one or more species. SUBGENERIC, a. *sŭb'jĕ-nĕr'ĭk,* pertaining to a subgenus.

SUBGLOBULAR, a. *sŭb-glŏb'ū-lėr* [L. *sub,* under, and *globular*]: somewhat globular.

SUB-GOVERNOR, n. *sŭb-gŭv'ėr-nėr* [L. *sub,* under, and *governor*]: a deputy or vice-governor; a subordinate governor.

SUBGRANULAR, a. *sŭb-grăn'ū-lėr* [L. *sub,* under, and *granular*]: somewhat granular.

SUBICULUM, n. *sŭb-ĭk'ū-lŭm* [L. *subĭc'ŭlum,* an underlayer]: in *bot.,* the filamentous mycelium of certain fungi; the hypothallus.

SUB-INVOLUTION, n. *sŭb-ĭn'vō-lō'shŭn* [L. *sub,* somewhat, and *involution*]: the state or condition of the womb when it does not return to its usual size after delivery, but is somewhat larger and heavier.

SUBITO, ad. *sō'bĭ-tō* [It., quickly—from L. *subitus,* sudden]: in *music,* suddenly; quickly.

SUBJACENT, a. *sŭb-jā'sĕnt* [L. *sub,* under; *jacens* or *jacen'tem,* lying; *jacērĕ,* to lie]: lying under or in a lower situation. SUBJA'CENTLY, ad. *-lĭ.*

SUBJECT, a. *sŭb'jĕkt* [L. *subjec'tus,* laid or placed under—from *sub,* under; *jactus,* thrown or cast; *jacĕrĕ,* to cast]: being or living under the power or dominion

of another; placed or situated under; exposed; liable, either from extraneous or inherent causes; obedient; tributary: N. one who owes allegiance to a sovereign; one who lives under the dominion of another; that which is treated or handled in speaking, writing, art, etc.; materials; matter: a dead body for dissection; the theme; the topic; the hero of a piece: in *logic* and *gram.*, that part of a proposition concerning which anything is affirmed or denied: in *metaphysics* (see SUBJECTIVE: OBJECT). SUBJECT, v. *sŭb-jĕkt'*, to bring under; to subdue; to expose; to make liable; to put under or within the power of; to enslave; to cause to undergo; to submit; to make accountable; to make subservient. SUBJECT'ING, imp. SUBJECT'ED, pp. SUBJECTION, n. *sŭb-jĕk'-shŭn*, state of being under the power, control, and government of another. SUBJECT'IVE, a. *-ĭv*, relating to the subject; derived from one's own consciousness, in distinction from external observation; in the *phil. of mind*, *subjective* denotes what is to be referred to the thinking subject, *objective* what belongs to the object of thought (see OBJECT). SUBJECT'IVELY, ad, *-lĭ*. SUBJECT'-IVENESS, n. *-nĕs*, or SUBJECTIVITY, n. *sŭb'jĕk-tĭv'ĭ-tĭ*, the state of being subjective; an author's individuality as shown in his works. SUBJECT-MATTER, n. the matter or thought under consideration. SUBJECTIVE SENSATIONS, sensations which originate in the brain.—SYN. of 'subject, a.': subordinate; inferior; exposed; obnoxious; liable; subservient.

SUBJECT: in *psychology*, denotes (a) the conscious or (b) the psychological individual. It is, at times, used synonymously with Self, Ego and Self-Consciousness (q.v.). The psychological meaning of the term assumed importance in the writings of John Locke, who drew the distinction between an 'inner' and an 'outer' perception, a distinction that has been frequently employed since Locke wrote to define the difference between the psychical and the physical, the subject and the object (see MIND). As thus used, it leads to confusion. A more adequate conception of the subject regards experience as unitary—not made up of two heterogeneous parts; but as containing a subjective factor or aspect or datum and an objective datum. This double aspect of experience has been likened to the geometrical representation of a plane curve as the function of two variables, abscissæ and ordinates. Subject and subjective refer, in certain connections, to the body as distinguished from objects outside. Furthermore, the adjective is applied to particular kinds of mental experience: (a) processes which are immediately independent of external conditions (e.g., the images of memory and imagination or the sounds produce by aural disorders), or (b) experiences which are related in some peculiar or intimate way to the ego or self (e.g., feelings of pleasantness and unpleasantness are, in some systems, said to be subjective), or

(c) experiences that have no objective counterpart—as thoughts, volitions and emotions.—In experimental procedure in psychology, the observer is frequently spoken of as the 'subject.'

SUBJECT AND SUBJECTIVE: in *philosophy,* subject and subjective have been given many different meanings. In the first place, modern and scholastic usages of the terms 'subject' and 'object,' 'subjective' and 'objective' are almost diametrically opposed. In scholastic philosophy, *subjectivum* referred to what are now regarded as the objects of thought; *objectivum* to the perceiving mind. The change of meaning which makes 'subjective' refer to the thinking individual or to mental activity in contrast to the objects of thought (i.e., things which possess an existence independent of the subject) seems to have come into common use as late as the eighteenth century. As soon as object and subject are made to express the complementary relations involved in knowledge, a variety of interpretations of 'objective' and 'subjective' are suggested. Thus subject may stand (1) for individual opinion as opposed to the common belief of mankind, as when one says that the view of a biased person is 'merely subjective'; or (2) for imaginary as opposed to real objects. Natural science (3) speaks of 'subjective errors' or 'errors of observation' as distortions of the 'true' object or event. Again subject may serve (4) to indicate the fact that human knowledge at large falls short of the real 'objective' nature of things, or finally (5) it may stand, in an ontological system, as descriptive of thought in contradistinction to being. (For historical instances see R. Eisler, *Wörterbuch der philosophischen Begriffe,* 2d ed., 1904, vol. ii., pp. 439ff.)

SUBJECTED, a. *sŭb-jĕkt'ĕd:* a word in *Milton,* used in the sense of 'subjacent.'

SUBJECTIVISM: in *philosophy,* a type of skepticism which, in its extreme form, limits knowledge to the state or affection of the knower or subject, and, accordingly, denies the objective validity of knowledge. The term is often used synonymously with subjective idealism and solipsism (see IDEALISM). *Individual subjectivism* makes the individual the measure of knowledge; *general subjectivism* sees in human cognition at large its essential and determining conditions. In *ethics,* subjectivism (a) denies the existence of objective and universally valid moral judgments and obligations or (b) defines the end of moral action as a subjective state of pleasure or of happiness.

SUBJOIN, v. *sŭb-joyn'* [L. *sub,* under, and *join*]: to add at the end; to affix; to attach. SUBJOIN'ING, imp. SUBJOINED', pp. *-joynd'.*—SYN. of 'subjoin': to annex; add; join; unite; coalesce.

SUBJUGATE, v. *sŭb'jū-gāt* [L. *subjugātus,* put under

or attached to the yoke; *subjugārĕ*, to bring under the yoke—from *sub*, under; *jugum*, a yoke: F. *subjuguer*]: to subdue and bring under the yoke, power, or dominion of; to conquer by force. SUB'JUGATING, imp. SUB'JUGATED, pp. SUB'JUGATOR, n. *-gā-tėr*, one who subjugates. SUB'JUGA'TION, n. *-gā'shŭn*, the act of subduing and bringing under the absolute control of another.—SYN. of 'subjugate': to conquer; vanquish; overcome; surmount; subject.

SUBJUNCTIVE, a. *sŭb-jŭngk'tĭv* [mid. L. *subjunctīvus*, subjunctive—from L. *sub*, under; *junctus*, pp. of *jungĕrĕ*, to join]: added to something before said or written; in *gram.*, applied to those parts of verbs which in composition follow and depend on other verbs, and express *contingency*, and which are usually preceded by *if, though, unless, except, until*, etc. SUBJUNC'TION, n. *-shŭn*, the act of subjoining or state of being subjoined.

SUBKINGDOMS, ANIMAL: great primary divisions of the animal world. The subkingdoms are termed also 'morphological types,' which term indicates their constitution more definitely than the name 'subkingdom.' As an example of the manner in which a 'subkingdom' of animals is constituted, we select that of the *Arthropoda*, a group of animals containing crustaceans, spiders, insects, and centipedes. These, united by Cuvier with the segmented worms to form the *Annulosa* or ARTICULATA (q.v.), are now accorded separate rank. A lobster may be selected as a typical example of this group. In the detailed examination of this animal, we may note that the jointed nature of the tail is perceptible in the forepart of the body, notwithstanding that the forepart consists apparently of a single piece. A further examination of the lobster's body would reveal the fact that each joint and its appendages—the latter being 'paired'—agrees in essential or fundamental structure with every other joint of the body. The investigation of the plan of structure of the lobster's frame would show the absence of an internal skeleton, also a very typical arrangement of parts. The *heart* lies dorsally, or on the back. The *digestive system* occupies a median position; and the *nervous system* lies ventrally, or on the floor of the body; the nerve-axis of the lobster further consists, typically, of a double chain of nervous masses (or *ganglia*) united by nervous cords, and from which branches proceed to the various parts of the body. The ideas that we may gain regarding the *general type of structure* of the lobster's body, or plan on which that body is built up may be thus summarized: (1) The body is jointed; (2) the joints and their appendages are fundamentally similar or homologous; (3) the heart lies dorsally, the nervous system ventrally, while the digestive system occupies the median position; (4) the appendages are in pairs. Now, if we examine the body of any in-

sect, we shall find it essentially to resemble that of the lobster in the general arrangement of its parts. The body of a spider or a scorpion exhibits a similar disposition of organs to that of the lobster, and shows a fundamentally similar structure beneath variations in appearance and form; a centipede's body also would be found constructed on the lobster type. The barnacles, water-fleas, crabs, and a whole host of animals more or less nearly allied to the lobster, and belonging to the lobster's class (that of the *Crustacea*), show a near relationship with the typical animal; while worms generally (leeches, earth-worms, etc.) would present a fundamental similarity in their characters to those described as existing in the lobster. We thus discover uniformity of type beneath variations in form and appearance, and it is exactly this broad structural likeness between apparently different animals which enables us to group them together to form 'subkingdoms' or 'types.' A subkingdom or type of animals may therefore be defined as consisting of a *number of animals whose bodies are constructed on the same fundamental plan.* The animal world has been thus divided into five or six subkingdoms. Between some of these groups recent research—influenced by the doctrine of evolution, unfavorable to the construction of defined subkingdoms or types—has claimed to find some connecting-links. A classification long recognized was as follows:

I. PROTOZOA—Ex.: Sponges, infusoria, amœbæ, and other animalcular forms.

II. CŒLENTERATA—Ex.: Sea-anemones, corals, zoophytes, jelly-fishes.

III. ECHINOZOA—Ex.: Sea-urchins, star-fishes, crinoids, sea-cucumbers, tape-worms, flukes, etc.

IV. ANNULOSA—Ex.: Worms, insects, centipedes, spiders, crustacea.

V. MOLLUSCA—Ex.: Sea-mats, sea-squirts, lamp-shells, shell-fish, cuttle-fishes.

VI. VERTEBRATA—Ex.: Fishes, amphibia, reptiles, birds, mammals.

For the present 7 or 8 subkingdoms, as given provisionally or by conflicting authorities, and for subdivisions, see ZOOLOGY.—Since the recent effort to find genetic connections among the different types of animals, the word subkingdom is regarded as somewhat old-fashioned and is often replaced by Branch or Phylum.

SUBLAPSARIAN, n. *sŭb'lăp-sā'rĭ-ăn* [L. *sub*, under, after; *lapsus*, fall]: term descriptive of one of the two sections in the school of theologians who maintain the doctrine of absolute divine decrees of Election and Reprobation. It is possible to conceive God making such a decree in two different ways—either (1) on the hypothesis of his foresight of the fall of Adam, and thus of man's original sin; or (2) independently of such

foresight on his part, and without any reference to such foresight—i.e., entirely out of his own will and determination. The Sublapsarian system supposes the first of these ways; and thus refers the eternal election or reprobation of men by God to his foreseeing (rather than his positively decreeing) that all men would fall in Adam, and thus would deserve eternal reprobation—the election of grace being simply a remedy for an existing evil. Out of the entire mass of mankind thus fallen, he in his sovereign grace freely elects a certain number to life; by virtue of which electing act, he in an equal exercise of his sovereignty leaves the others, non-elect, to the death which their sins deserve. The section of theologians maintaining the second of the two ways above noted are termed Supralapsarian (q.v.). This distinction is not confined to the Calvinistic schools; it is found also among Roman Catholics. SUBLAPSARIAN, a. pertaining to the doctrine of the Sublapsarians; done after the fall of man.

SUBLET, v. *sŭb-lĕt'* [L. *sub,* under, and *let*]: to let, as one tenant to another.

SUBLIEUTENANT, n. *sŭb'lū-tĕn'ănt* [L. *sub,* under, and *lieutenant*]: in the British navy, officer next below a lieutenant, formerly called Mate.—In the British army, cornets and ensigns are now sublieutenants.

SUBLIMATE, v. *sŭb'lĭ-māt* [L. *sublimātus,* lifted up on high; *sublimārĕ,* to elevate—from *sublīmis,* lofty: It. *sublimare;* F. *sublimer,* to sublimate, to elevate]: to bring a solid substance directly into a vapor by heat—better in this sense, SUBLIME (q.v.): to refine and exalt; to elevate: N. the product of sublimation. SUB'LIMATE, a., or SUB'LIMATED, a. brought into a state of vapor by heat. SUB'LIMATING, imp. SUB'LIMATED, pp. SUB'LIMA'TION, n. *-mā'shŭn* [F.—L.]: operation of bringing a solid substance into the state of a vapor by heat, and condensing it again; act of improving or purifying; that which is refined and purified (see below). BLUE SUBLIMATE, a preparation of mercury, sulphur, and sal-ammoniac, used in painting. CORROSIVE SUBLIMATE, a very poisonous preparation of mercury.

SUBLIMA'TION: chemical process similar to distillation, but differing from it in the nature of the substances to which it is applied. In distillation, *liquids* are converted by the agency of heat into vapor, which is condensed in the liquid form usually by the cooling action of water; in sublimation, *solid* bodies are reduced by heat to the state of vapor, which reassumes the solid form on cooling. Sublimation is conducted usually in a single vessel of glass or iron, the product being deposited in the upper part of it in a solid state, while the impure residue remains at the bottom; but in the case of sulphur, the vapor is condensed on the walls of a large chamber. Iodine affords a good example of sublimation: on gently heating the lower part of a Florence flask con-

taining a little of this substance, a purple vapor rises, which almost immediately condenses in small, brilliant, dark-purple crystals in the upper parts of the flask, while any impurity that may be present remains at the bottom. Among substances obtained by this process and employed in the Pharmacopœia, are arsenious acid, benzoic acid, corrosive sublimate, and sublimed sulphur.

SUBLIME, a. *sŭb-līm'* [F. *sublime*—from L. *sublīmis*, exalted, high: It. *sublime*]: elevated aloft; very high in excellence; lofty in style or sentiment; grand; lofty in mien; majestic; in *OE.*, elevated by joy: V. to reduce a solid substance directly into a state of vapor by heat, to be again brought to a solid state by cooling (see SUBLIMATION): to exalt; to improve. SUBLI'MING, imp.: ADJ. elevating, refining: N. act or process of Sublimation (q.v.). SUBLIMED, pp. *-līmd':* ADJ. elevated. SUBLIME'LY, ad. *-lĭ.* SUBLIM'ITY, n. *-lĭm'ĭ-tĭ*, or SUBLIME'NESS, n. *-līm'nĕs*, lofty height; loftiness of style or sentiment; moral grandeur; vastness; lofty grandeur, whether exhibited in the works of nature or art; the astonishment and awe impressed on the mind by the contemplation of the lofty or grand in nature or art, or of exalted excellence. THE SUBLIME, the surpassing grand in nature or art, as distinguished from *the beautiful* (see below): a grand or lofty style.—SYN. of 'sublime, a.': grand; exalted; lofty; noble; imposing; magnificent; splendid; stately; august; superb.

SUBLIME': term applied to objects indicating great Power, vast Expanse, or lofty Elevation, which excite in the beholder a feeling of pleasurable elation: the term 'sublime' is applied also, loosely, to the feeling.

The precise quality in things that arouses this mode of pleasurable excitement has been variously assigned. According to Burke, *terror* is, in all cases whatsoever, either openly or latently the ruling principle, or, at all events one of the chief sources of Sublimity. Kant holds that sublimity exists in three forms: a mathematical of Space, Time and a dynamical of Power. The feeling also has been described variously. If this could be fixed, we should have a key to the objective quality. In a treatise, until recently attributed to Longinus, but now thought to be of earlier date, Sublimity is first definitely distinguished as an æsthetic category where it is characterized, in reference to literary composition, as 'filling the reader with a glorying, and sense of inward greatness.' Some would call it a 'sense of security' in circumstances of terror or danger. Hamilton describes it as 'a mingled feeling of pleasure and pain—pleasure in the consciousness of the strong energy, pain in the consciousness that this energy is vain.' The connection with the sentiment of Power is generally admitted; but as the comparison of the object with self suggests our own littleness at the same time, there may be doubt whether the emotion is due to the Power, to the Littleness, or to the combination of both.

Referring to the generic sentiment of Power, which is evidently at the foundation, we find that the feeling of superior might in ourselves is cheering, elating, stimulating; and that the sense of littleness or inferiority is a depressing and enfeebling state of mind, a state of pure pain, redeemable in certain circumstances by other feelings, as when our inferiority is only in the comparison with an object of love or veneration, or when it is the condition of some compensating superiority—'the courtier stoops to rise.' The presumption, therefore, is that the elation of the Sublime is connected with the notion of Power. It may be felt though the power is not actually possessed, but imagined, borrowed, or conceived, through a sort of sympathy with the *appearances* of great power or might. If this account of the feeling be correct, Power must be a principal quality in its objects; and if with this there be combined voluminous sensation (and the corresponding ideas, vastness of expanse and greatness of time), the explanation of the Sublime in all its forms may probably be attained.

SUBLIME PORTE, or OTTOMAN PORTE: the common term for the Turkish government. The chief office of the Ottoman empire is styled Babi Ali, meaning the High Gate, from the gate (bab) of the palace at which justice was administered; and the French translation of this term being Sublime Porte, hence the use of this word. See TURKEY.

SUBLINGUAL, a. *sŭb-lĭng'wăl* [L. *sub*, under; *lingua*, the tongue]: situated under the tongue.

SUBLOBULAR, a. *sŭb-lŏb'ū-lėr* [L. *sub*, somewhat, and *lobular*]: denoting the small veins of the liver on which the lobules rest, and into which the intralobular veins pour their blood.

SUBLUNAR, a. *sŭb-lô'nėr*, or SUBLU'NARY, a. *-ner-ĭ* [L. *sub*, under; *luna*, the moon: It. *sublunare;* F. *sublunaire*]: *lit.*, situated under the moon; pertaining to this world; terrestrial. SUBLU'NARY, n. in *OE.*, anything worldly.

SUBLUXATION, n. *sŭb-lŭks-ā'shŭn* [L. *sub*, under, and *luxation*]: in *surg.*, an incomplete dislocation; a violent sprain.

SUBMARINE, a. *sŭb'mă-rēn'* [L. *sub*, under, and *marine*]: under the sea; submerged; applied to objects situated at some depth in the waters of the sea, or covered by the waters of the ocean. SUBMARINE CABLE, cable laid on the sea-bottom inclosing telegraph wires.

SUBMARINE' FORESTS: term applied to the stools of trees which occupy the sites on which they grew, usually rooted in impure peat; but, by change of level, the ancient forest surfaces are now covered by the tide even at low water. No kind of tree has been found in these forests which does not exist at the present day in the country, and the underwood and herbaceous plants,

so far as determined, agree specifically with those found now in similar localities. Submarine forests belong to the Recent or Quaternary period, and occur above the Bowlder Clay. Examples occur on the coast of New Jersey, and elsewhere on shores undergoing subsidence. Subaqueous remains of forests are found also in some lakes and rivers, e.g., on the Columbia river; these may result from rise of water-level by obstruction, or, in some cases, from local subsidence due to earthquakes or other causes.

SUBMARINE NAVIGATION, History of: the record of attempts to perfect submarine vessels begins with the early 17th century, since which time the problem has well-nigh constantly enlisted inventive skill. From about 1850 almost every year has witnessed some new design or practical experiment. The earliest submarine boat chronicled was that constructed in 1620 by the Dutch natural philosopher, Cornelis van Drebbel. Van Drebbel built several examples conforming to a general type. They were wooden, and were rendered watertight by greased leather stretched over the hull. In one of them James I. of England made a lengthy trip. The first real success was, however, reserved for the American engineer, David Bushnell, whose boat, the Turtle (1775), took its name from its plan of construction. Robert Fulton developed a submarine torpedo-boat for maritime defense, the Nautilus, in which on one occasion he remained submerged for five hours. But it was rejected successively by the French, British, and United States governments. The first patent for a submarine boat was obtained in France by Castera in 1827, his invention being a prototype of Simon Lake's Argonaut, mentioned below. Wilhelm Bauer was a persistent inventor, endeavoring to gain acceptance of his plans from Germany, Austria, England, and Russia. For the last he built Le Diable Marin, in which, at the coronation of Czar Alexander II., he remained submerged throughout the entire ceremony. The use of electric power for submarine boats was first suggested by Marié-Davy in 1854. The Plongeur, devised by Bourgeois and Brun, was launched in 1863. The various experiments made with it were not, indeed, highly successful, but some results of importance were obtained. Attention was directed in 1859 to a submarine boat constructed by Delaney of Chicago. A steam-engine was to furnish the propelling power. The embarrassments to its use were too many and difficult to permit its permanent success. Later, a boat called the Intelligent Whale, having an extended egg-shape, and provided with most needful contrivances, was exhibited in Brooklyn, N. Y. It proved, however, too cumbrous for convenient use. Goubet, of Paris, in 1882, constructed a submarine boat with such success as to receive an order from the Russian government for 300 sets of his machinery. In the Russian boats elec-

tricity is the motive power, the speed being five knots.

The civil war in America was naturally a stimulus to numerous attempts in connection with submarine invention. A Confederate boat with a nearly submerged hull attacked and slightly injured the Federal armorclad New Ironsides on Oct. 5, 1863. The Federal Housatonic was destroyed in Charleston harbor in 1864 by another such Confederate boat. The vessels of this type were of boiler-iron, about 35 ft. in length, and called 'Davids,' from their appearance of insignificance in comparison with their adversaries. The American invention (1866) of Raeber was not, however, intended for offensive purposes. From the design by Lacomme (1869), a French physician, of a submarine cross-Channel railway, was developed the submarine ferry-boat of Goubet. The Russian Drzewiecki constructed a boat in 1877, and this he followed by six others of an improved pattern. The first trial of a boat patented by G. W. Garrett in 1878 was a success; in 1879 a second boat by Garrett, the Resurgam, was put into commission. A submersible by Berkeley and Hotchkiss (1880), which has been called 'one of the most ingenious and interesting vessels ever designed,' attracted slight notice. In 1881 G. W. Garrett patented a third boat, in conjunction with T. V. Nordenfelt; in this steam was employed as a motive power. Campbell and Ash invented another Nautilus in 1884, and it was successfully tried; but apparently nothing further was done with it. Waddington's Porpoise, invented in 1885, carried out numerous experiments of value, and was thought to be a great advance on predecessors. The Gymnote was invented by Gustave Zédé in 1888. It was a boat 56 ft. long, of 30 tons displacement, and was submerged by having water-tight compartments filled until its buoyancy was greatly reduced and then being made to dive by means of horizontal rudders. It attained a speed of 10 knots. So successful was it when tried that a larger boat of the same general design, the Gustave Zédé, was built from the designs of the engineer Romazotti and launched in 1893. In the monograph, *The Argonaut: Her Evolution and History,* Simon Lake explains his invention, the first example of which was built in 1894, the second in 1897. Its object was wholly peaceful, the inventor claiming for it great value in laying submarine foundations, in recovering gold from seacoast and river bottoms, in submarine wrecking, and for scientific purposes. On one occasion it was submerged for 10¼ hours. It is designed to roll along the bottom of the sea like a locomotive, and to explore the bottom of the ocean for sunken treasures. The vessel is operated by steam when on the surface and by an electric motor when under water. This boat in 1898 made a voyage of 200 m. under and on the surface of Lake Champlain. In recent times many national governments have experimented with various types of the submarine. The United States had them for many years

under consideration. In 1892 an appropriation of $200,000 was made to permit the navy department to build and test a submarine. The plans of J. P. Holland were selected. The first Holland boat, the beginning of the really successful submarine, was built in 1875; a second was launched in 1877, a third in 1881. After severe tests of the 9th type, commonly known as the Holland, the 10th type was ordered in 1900. This boat can dive like a duck, and on the surface, it makes about 10 knots an hour. It carries three torpedo tubes and uses the largest size of Whitehead torpedoes. In 1903 eight submarines were put in commission, with a speed varying from 8 to 8.87 knots, a displacement in general of 122.55 tons, and with one exception of 160 horsepower. Consult for further information as to theory and practice in submarine invention the valuable work by A. H. Burgoyne, *Submarine Navigation, Past and Present* (1904). In 1908, the navies of the world had 213 submarines, France and Great Britain each with 61, Russia 35, United States 19, Japan 16, Italy 13, Germany had but 4, and Portugal and the Netherlands 1 each.

SUBMARINE PHOTOGRAPHY: a process of taking photographs under water discovered by Dr. L. Boutan, professor of zoology at the University of Paris. He has made successful experiments, to the depth of several thousand feet, on the coast of France and in the waters of the Mediterranean. Dr. Boutan in taking these photographs wears the regular diver's suit and extra heavy leaden shoes, so as to get a good foothold on the bottom of the sea. He uses the ordinary outfit of a photographer, with the exception that he has it all protected by waterproof coverings. He places his Leyden jars in a barrel which is surmounted by a bell glass provided with the necessary lamp. The latter is a spirit lamp to which is attached a receptacle for the magnesium powder connected with the usual pneumatic ball and tube. The photographs are taken by the instantaneous flash which follows the scattering of powdered magnesium into the flame. He has a branch tube connected with the pneumatic ball which forces a puff of air into the powder and carries it into the flame, exposing the lens at the moment of maximum light. The pictures taken at the bottom of the sea by this process show no material difference from those produced in the ordinary way by the instantaneous method, with one exception, that the negatives have a peculiarly soft tone.

SUBMAXILLARY, a. *sŭb-măks'ĭl-ĕr-ĭ* [L. *sub*, under, and *maxillary*]: lying beneath the jaw. SUBMAXILLARY GANGLION (see NERVOUS SYSTEM; SALIVARY GLANDS).

SUBMEDIAL, a. *sŭb-mē'dĭ-ăl*, or SUBME'DIAN, a. *-ăn* [L. *sub*, under; *medĭus*, the middle]: lying under or below the middle of the body. SUBME'DIANT, n. *-ănt*, in *music*, the middle note between the octave and subdominant.

SUBMENTAL, a. *sŭb-mĕn'tăl* [L. *sub*, under; *mentum*, the chin]: in *anat.*, situated under the chin; applied to a branch of the external maxillary artery.

SUBMERGE, v. *sŭb-mĕrj'* [F. *submerger*—from L.*sub*, under; *mergĕre*, to immerse]: to put under water; to drown; to cover or overflow with water; to sink or plunge under water. SUBMERG'ING, imp. SUBMERGED, pp. *sŭb-mĕrjd'*: ADJ. under water. SUBMERG'ENCE, n. *-mĕrj'ĕns*, the act of putting under water; state of being under water; in *geol.*, applied to all sinkings of the land whereby its surface is brought under the waters of the ocean.

SUBMERSED, a. *sŭb-mĕrst'* [L. *sub*, under; *mersus*, dipped or plunged; *mergĕrĕ*, *to* dip]: being or growing under water, as the leaves of aquatic plants. SUBMER'SION, n. *-mer'shŭn* [F.—L]: the act of putting under water; the state of being put under water or other fluid; the act of causing to be overflowed; act of drowning.

SUBMETALLIC, a. *sŭb'mĕ-tăl'ĭk* [L. *sub*, under, and *metallic*]: imperfectly metallic.

SUBMISSION, n. *sŭb-mĭsh'ŭn* [L. *submissĭō* or *submissĭōnem*, a letting down—from *sub*, under; *missus*, pp. of *mittĕrĕ*, to send]: the act of yielding to power or authority; acknowledgment of inferiority or dependence; humble or suppliant behavior; resignation. SUBMIS'SIVE, a. *-mĭs'sĭv*, yielding one's will to the will or power of another; acknowledging one's inferiority; compliant; modest. SUBMIS'SIVELY, ad. *-lĭ*. SUBMIS'SIVENESS, n. *-nĕs*, quality of being submissive; acknowledgment of inferiority; confession of fault or blame.—SYN. of 'submissive'; obedient; humble; yielding; dutiful; obsequious; subservient; passive; patient.

SUBMIT, v. *sŭb-mĭt'* [L. *sub*, under; *mitto*, I send]: to yield or surrender to the power or will of another; to leave or refer to the judgment of another; to cease to resist; to comply; to yield without murmuring; to surrender; to yield; to be subject. SUBMIT'TING, imp. SUBMIT'TED, pp. SUBMIT'TER, n. *-tĕr*, one who submits.

SUBMUCOUS, a. *sŭb-mū'kŭs* [L. *sub*, under, and *mucous*]: applied to a coat of the small intestine, connected more firmly with the mucous than with the muscular coat, between which two it is placed.

SUBMULTIPLE, n. *sŭb-mŭl'tĭ-pl* [L. *sub*, under, and *multiple*]: such a part of a number or quantity as can be contained in it an exact number of times; an aliquot part.

SUBNARCOTIC, a. *sŭb'nâr-kŏt'ĭk* [L. *sub*. under, and *narcotic*]: moderately narcotic.

SUBNASCENT, a. *sŭb-năs'ĕnt* [L. *sub*, under; *nascens* or *nascen'tem*, growing; *nasci*, to grow]: growing underneath.

SUBNORMAL, n. *sŭb-nŏr'măl* [L. *sub*, under, and *nor-*

mal]: in *conic sections*, the part of a diameter intercepted between the ordinate and the normal.

SUBNUDE, a. *sŭb-nūd'* [L. *sub*, under; *nudus*, naked]: in *bot.*, almost naked or bare of leaves.

SUBOCCIPITAL, a. *sŭb'ŏk-sĭp'ĭ-tăl* [L. *sub*, under, and *occipital*]: applied to a branch of the first spinal nerve which runs under the back of the head.

SUBORDINATE, a. *sŭb-ŏr-dĭ-nāt* [L. *sub*, under, and *ordinate*]: inferior in nature, rank, or importance; descending in a regular series: N. one who stands in rank or dignity below another: an inferior person: V. to place in order or rank below another; to consider of less value or importance; to make of less value; to bring under control. SUBOR'DINATING, imp. SUBOR'DINATED, pp. SUBOR'DINATELY, ad. *-lĭ*, in a lower rank; of inferior importance. SUBOR'DINA'TION, n. *-nā'shŭn* [F.—L.]: inferiority of rank or dignity; place of rank among inferiors; a series regularly descending.

SUBORN, v. *sŭb-ŏrn'* [F. *suborner*, to suborn—from L. *subornārĕ*, to fit out secretly—from *sub*, under; *ornārĕ*, to fit out: It. *subornare*]: to procure privately or by indirect means; to employ a person to take a false oath; to incite one to commit perjury; to bribe. SUBORN'ING, imp. SUBORNED', pp. *-ŏrnd'*. SUBOR'NER, n. *ŏr'nĕr*, one who procures another to take a false oath or do a bad action. SUBORNATION, n. *sŭb'ŏr-nā'shŭn* [F.—L.]: crime of procuring a person to take such a false oath as to constitute Perjury (q.v.).

SUBOVATE, a. *sŭb-ō'vāt* [L. *sub*, under, and *ovate*]: nearly in the shape of an egg.

SUBPANATION, n. *sŭb-pā-nā'shŭn* [L. *sub*, under, and *panis*, bread]: doctrine that Christ's body and blood are locally and materially present in the eucharist under the form of bread and wine.

SUBPERITONEAL, a. *sŭb-pĕr'ĭ-tō-nē'ăl* [L. *sub*, under, and *peritoneal*]: in *anat.*, applied to a layer of areolar tissue, distinct from the abdominal fasciæ, by which the parietal portion of the peritoneum is connected loosely with the fascia lining the abdomen and pelvis.

SUBPŒNA, n. *sŭb-pē'nă* [L. *sub*. under; *pœna*, pain, penalty]: in *law*, the writ or process by which the attendance of a witness in a court of justice is compelled, commanding him to lay aside his business and all excuses, and attend at the time and place indicated, under a penalty. If the witness is required to produce a document, the writ is called a *subpœna duces tecum*. If the witness does not attend, and has not a good legal excuse, such as dangerous illness, he may be sued in an action of damages, or committed to prison. SUBPŒNA, v. to serve with a writ of subpœna. SUBPŒ'NAING, imp. *-nă-ĭng*. SUBPŒ'NAED, pp. *-nād*, served with a writ to attend a court as a witness, etc.

SUBPRIOR, n. *sŭb-prī'ŏr* [L. *sub*, under, and *prior*]: one who assists the prior.

SUBQUADRATE, a. *sŭb-kwŏd'rāt* [L. *sub*, under, and *quadrate*]: nearly square.

SUBQUADRUPLE, a. *sŭb-kwŏd'rū-pl* [L. *sub*, under, and *quadruple*]: containing one part of four.

SUBROGATION, n. *sŭb'rō-gā'shŭn* [L. *sub*, under, and *rogation*]: in *law*, the substitution of one person in the place of another; especially, the substitution of a third party in the stead of a creditor—the subrogated person succeeding to the rights and securities of the original creditor. S. is originally a term of the Roman law, in which it expresses the legal fiction whereby an obligation extinguished by payment made by a third party is considered as persisting in favor of this third party, who in the eyes of the law is now one same person with the creditor. In the United States, 'under the initial guidance of Chancellor Kent,' says Sheldon (*Subr.*, §1), 'its principles have been more widely developed than in England. It is treated as the creature of equity, and is so administered as to secure real and essential justice.... It is broad enough to include every instance in which one party pays a debt for which another is primarily answerable.'

SUB ROSA, *sŭb rō'zā* [L. under the rose]: phrase meaning between ourselves, or in secrecy. It was customary among the ancient Germans, on festive occasions, to suspend a rose from the ceiling above the table, as a symbol that whatever was said or done during the feast by those present would be afterward forgotten, or at least be kept as a secret among themselves.

SUBSALT, n. *sŭb'sawlt* [L. *sub*, and *salt*]: a salt having an excess of the base.

SUBSCAPULAR, a. *sŭb skăp'ū-lĕr* [L. *sub*, and *scapular*]: in *anat.*, applied to the large branch of the axillary artery, rising near the lowest margin of the scapula.

SUBSCRIBE, v. *sŭb-skrīb'* [L. *subscrībĕrĕ*, to write underneath—from *sub*, under; *scrībo*, I write]: to sign with one's own hand; to attest, as a document, by writing underneath; to give or contribute by writing one's own name; to promise to give a sum of money by writing one's name in a book or on a paper, called a *subscription book* or a *subscription paper;* to assent; in *OE.*, to submit. SUBSCRI'BING, imp. SUBSCRIBED', pp. *skrībd'*. SUBSCRI'BER, n. *-bĕr*, one who contributes to any object, or for any particular purpose: one who promises to take and pay for a newspaper, periodical, or book by entering his name. SUBSCRIP'TION, n. *-skrĭp'shŭn*, the act of subscribing; the name subscribed or written; a signature; consent or attestation by writing the name (see SUBSCRIPTION, in Law): the act of giving money for any undertaking; the money so given; in *OE.* submission; obedience.

SUBSCRIP'TION, in Law: the placing of one's signature at the end of an engagement written or printed, or at the end of an attestation: an illiterate person makes a sufficient S. by inscribing his mark. The name of the act of subscribing has both in legal and popular use passed over to the subject-matter of the engagement: thus the money that a person contracts to supply for a charitable end, or to pay for a newspaper or for a book, is a S. One who subscribes for shares of a chartered company is held in law to make good his subscription. The law as to subscriptions for charitable objects is unsettled; but whenever, on the faith of funds subscribed, liabilities are incurred, the subscribers are held to carry out their engagements.

SUBSECTION, n. *sŭb-sĕk'shŭn* [L. *sub*, under, and *section*]: a subdivision; the part or division of a section.

SUBSELLIA, n. plu. *sŭb-sĕl'lĭ-ă* [L. *subsel'lĭum*, a low bench or form—from *sub*, under; *sella*, a seat]: certain small shelving seats in the stalls of cathedral and other churches; also called *misereres*.

SUBSEMITONE, n. *sŭb-sĕm'ĭ-tōn* [L. *sub*, under, and *semitone*]: in *music*, the seventh note of the diatonic scale.

SUBSEQUENT, a. *sŭb'sĕ-kwĕnt* [L. *subsĕquens* or *subsĕquen'tem*, following close after—from *sub*, after; *sequor*, I follow]: coming or being after; following in time; succeeding. SUB'SEQUENTLY, ad. *-lĭ*, at a later time; so as to follow in train.

SUBSEROUS, a. *sŭb-sē'rŭs* [L. *sub*, under, and *serous*] applied to the connective tissue beneath the serous membranes.

SUBSERVE, v. *sŭb-sĕrv'* [L. *subservīrĕ*, to be subject to —from *sub*, under; *servĭō*, I serve]: to serve in subordination to; to serve in an inferior capacity; to help forward; to promote. SUBSERV'ING, imp. SUBSERVED', pp. *-sĕrvd'*. SUBSER'VIENT, a. *-sĕr'vĭ-ĕnt* [L. *sub*, under; *servĭens* or *servĭen'tem*, serving]: serving to promote some particular purpose or end; subordinate; useful as an instr. to promote a purpose; meanly complying; truckling. SUBSER'VIENTLY, ad. *-lĭ*. SUBSER'VIENCE, n. *-ĕns*, or SUBSER'VIENCY, n. *-ĕn-sĭ*, instrumental fitness; use or operation that promotes some purpose; servility.

SUBSESSILE, a. *sŭb-sĕs'ĭl* [L *sub*, somewhat, and *sessile*]: in *bot.*, nearly sessile; almost without a stalk.

SUBSIDE, v. *sŭb-sīd'* [L. *subsīdĕrĕ*, to settle or sink down—from *sub*, under; *sīdo*, I settle; allied to *sedĕō*, I sit]: to sink or fall to the bottom; to settle; to fall into a state of quiet; to become tranquil; to abate. SUBSI'DING, imp.: ADJ. slowly and gradually sinking. SUBSI'DED, pp. SUBSI'DENCE, n. *-dĕns*, or SUBSI'DENCY, n. *-dĕn-sĭ*, the act or process of sinking or settling down to a lower level.

SUBSIDIARY, a. *sŭb-sĭd'ĭ-ĕr-ĭ* [F. *subsidiaire*—from L. *subsidĭārĭus*, belonging to a reserve, subsidiary—from *subsidĭum*, a body of reserve, support (see SUBSIDY)]: assisting; furnishing help or additional supplies: N. an assistant; he or that which contributes aid

SUB'SIDIES: term in politics, used in various senses —(1.) In English political history, taxes levied not immediately on property, but on persons, classed according to their reputed estates in lands or goods; or customs imposed on any of the staple commodities in addition to the *costuma magna et antiqua*. Thus, 30,000 sacks of wool were granted to Edward III., 1340, in aid of the war with France. S. were granted on various occasions to James I. and Charles II.—(2) In international affairs, money paid by one state to another to procure a limited succor of auxiliary troops, ships of war, milit. supplies, or provisions. In the war with the revolutionists of France and Napoleon I., Great Britain furnished S. to foreign powers to a large extent, to engage them to resist the progress of the French. In questions regarding S., it is held that the state furnishing the succor does not thereby become the enemy of the opposite belligerent: it may remain neutral in all respects, except as regards the auxiliary forces supplied; e.g., the confederate cantons of Switzerland, while granting troops to various European powers, preserved a rigorous neutrality. The service of Swiss regiments abroad is no longer sanctioned.—(3) In governmental relations to commerce, etc., money granted by legislative act for creating or encouraging some undertaking important for the public interests; e.g., for establishing or aiding to maintain lines of steamships—thus encouraging and stimulating trade or commerce. It is argued that, though a general system of permanent S. is to be avoided, each case should be judged according to the present expediences indicated by the time and the circumstances. See BOUNTY: MONOPOLY: PATENT.

SUBSIDY, n. *sŭb'sĭ-dĭ*, SUB'SIDIES, n. plu. *-sĭ-dĭz* [F. *subside*, a subsidy—from L. *subsidĭum* aid, succor—from *sub*, under; *sedĕō*, I sit]: aid in money granted to a govt. through certain special taxes levied on classes of persons or on classes of goods: money granted from one state to another by treaty for aid in war: in general, money furnished for a particular purpose (see SUBSIDIES). SUB'SIDIZE, v. *-dīz*, to furnish with a subsidy; to obtain aid from another by the payment of a sum of money. SUB'SIDIZING, imp. SUB'SIDIZED, pp. *-dīzd*.

SUBSIST, v. *sŭb-sĭst'* [F. *subsister*, to subsist—from L. *subsistĕrĕ*, to remain standing—from *sub*, under; *sistĕrĕ*, to cause to stand]: to retain the present state; to have existence; to live; to be maintained, as with food and clothing; to have existence by means of something else; to inhere; to feed; to maintain, as to *subsist* an army. SUBSIST'ING, imp. SUBSIST'ED, pp. SUBSIST'ENCE, n. *-ĕns* [F. *subsistance*]: the means of living or supporting life; livelihood; support. SUBSIST'ENT, a. *-ĕnt*, having real being; inherent.—SYN. of 'subsistence': living; maintenance; sustenance; aliment.

SUBSOIL, n. *sŭb'soyl* [L. *sub*, under, and *soil*]: the soil lying under the surface-soil; the stratum of earth lying between the upper soil and the rocks.

SUB'SOILING: method of plowing (see PLOW) by which a layer of ground immediately under the stratum of productive soil is loosened and partially pulverized. On light land lying upon a porous subsoil the operation would be of no benefit, and in some cases would be positively injurious; but on firm soils overlying an impervious subsoil it is often highly beneficial. The effects of S. depend greatly on the time and manner of the work. Lands that will be highly benefited by S. at the right time may be seriously injured if the operation is performed when they are too dry or too wet. By breaking the hard substratum of ground, S. allows the escape of surplus water, which otherwise would soak the surface-soil to the great detriment of growing plants, make cultivation difficult and could be removed only by the slow process of evaporation; while in time of drought, S. allows the water, which the subsoil then holds like a sponge, to be drawn upward by capillary attraction. Thus, on soils of this kind, S. proves highly beneficial in both wet and dry seasons. There is the additional advantage of a much wider range for the roots of plants than could otherwise be secured. S. is done by means of implements for this special purpose (see PLOW).—See SOIL.

SUBSPECIES, n. *sŭb-spē'shēz* [L. *sub*, under, and *species*]: a division of a species; a variety.

SUBSTANCE, n. *sŭb'stăns* [F. *substance*—from L. *substantĭa*, that of which a thing consists, material—from *sub*, under; *sto*, I stand]: the essence or material of a thing; the main part; that which really exists, whether matter or spirit; body; something real or solid; goods; wealth; means of living; in *philosophy*, that which exists absolutely and of itself; the basis of attributes—thus forming the correlative of *attribute* (see below). SUBSTANTIAL, a. *sŭb-stăn'shăl* [L. *substantĭālis*]: actually existing; not seeming or imaginary; having substance or strength; material; stout; solid; having considerable wealth. SUBSTAN'TIALLY, ad. *-lĭ*, really; essentially. SUBSTAN'TIALNESS, n. *-nĕs*, or SUBSTAN'TIAL'ITY, n. *-shĭ-ăl'ĭ-tĭ*, state of real existence; materiality. SUBSTAN'TIALS, n. plu. *-shălz*, essential parts. SUBSTAN'TIATE, v. *-shĭ-āt*, to establish by proof or competent evidence; to make good; to verify. SUBSTAN'TIATING, imp. SUBSTAN'TIATED, pp. SUBSTANTIVE, a. *sŭb'stăn-tĭv*, solid; real; essential: N. in *gram.*, that part of speech which expresses something that exists, materially or immaterially; a noun or name.

SUB'STANCE: term prominent in certain discussions in Logic and Metaphysics. S. is correlative with Quality or Attribute: every S. must have attributes, and every attribute must be the atribute of some S. The S. gold has the attributes weight, color, etc. But as every power or property of a thing, every way in which the thing affects us, may be called an attribute or quality, if all the attributes are counted off, there is nothing left; and the question then arises: What is the *substance?* To avoid this seeming inconsistency, it was assumed that everything whatsoever possesses, besides its

attributes, an unknown substratum that they rest upon or inhere in—a mystical and inscrutable bond, that holds the attributes together without being itself an attribute. To avoid this gratuitous assumption, Locke and others found a meaning for substance without departing from the knowable. Every object has some *essential* or *fundamental* quality, which being present, the object preserves its identity; and which being removed, the object is no longer the same object, but another. Thus, the substance of Body or Matter is not the remnant after all the qualities are subtracted; it is the two fundamental and inerasable qualities Extension and Resistance. Size, shape, color, heat, odor, etc., all may be varied; but so long as Extension and Resistance, in any degree are found, we have a piece of matter. (The weak point in this theory—at least in this illustration of it—is, that size, shape, color, heat, odor, etc., all may be included in or resolved into Extension and Resistance; and that, though the former qualities are indeed variable, the latter likewise are variable). Applying the same view of Locke to the mind, the substance of Mind is whatever we regard as its fundamental essence or distinguishing marks: we may adopt Feeling, or Volition, or Intellect, or require a share of all three, according to our mode of defining the mind. It would, then, be a confusion of language to talk of Feeling, Volition, and Intellect as *inhering* in mind; they *are* mind.

Notwithstanding the obviousness of this explanation, the use of the terms Substance and Attribute has led to such inveterate demand for something that shall underlie all attributes—a substance of body, and a substance of mind—distinct from anything meant by the names, that many philosophers have considered it necessary to preserve the idea of substance, as a thing of belief, if not of knowledge. The doctrine of an unknowable substance in the abstract very early allied itself with the theory then in vogue as to the Perception of a material world, and the same arguments are good for or against both. Other names for expressing the same contrast are *noumenon* and *phenomenon*. The Phenomenon is what shows itself to our senses, or is conceived by our intelligence—the qualities of Extension and Resistance in body; and of Feeling, etc., in mind. The Noumenon is something apart and beyond, something inconceivable and unknowable, but which, say some, we are instinctively led to believe in. Thus, in the great question above alluded to—the belief of an independent material world—the phenomenal manifestations are inextricably involved with our mental powers of conceiving, and would vary if these powers were to vary; consequently they cannot be the absolute, independent, self-existent reality. See MIND; MATTER; METAPHYSICS.

SUBSTANTIALISM, *sŭb-stăn'shal-ĭzm:* in modern metaphysics, the antithesis of speculative idealism: in

recent physico-philosophy, the doctrine (originated and developed by A. Wilford Hall, PH.D., LL.D., of New York) that every force of nature—physical, vital, mental, and spiritual—is a real, substantial, though immaterial entity. The discussion has been mostly physical, as it starts with and rests on the phenomena of light, heat, and sound, particularly. Here, the doctrine antagonizes the vibratory or undulatory theory, which gives only matter with a propagated mechanical action. Dr. Hall at first adopted the old term 'corpuscular' for his theory, but afterward rejected it because it implies an emission of particles, which is no part of his philosophy. He regards all the forms of force as manifestations of one pervading force-substance, drawn from one reservoir. The luminiferous ether, with its vibrations, is rejected. Sound was his first stumbling-block, but is now seemingly so much in his favor that he has made converts of acousticians, such as C. W. Pearce, MUS.DOC., Cant., and George Ashdown Audsley, both of England. At first thought, nothing would seem to be clearer than that sound, when propagated by the air, is a succession of waves in the form of rarefactions and condensations in every direction, the vibrations being repeated by the drum-membrane of the ear. At first, Dr. Hall granted incidental air-waves; but he now considers them of no account, if existing even for a single foot from the most powerful sounding body: he attributes all to an immaterial sound-force (needing, however, a material conducting medium in order to travel, as shown by a bell in an exhausted receiver), making a string, a diaphragm, or a flame to move at a distance from the sounding instrument, when the 'vibrational number or tensional capacity' of the object and the instrument sufficiently agree. Mechanical vibration or tremor in that which occasions sound is simply the means by which the sound-force is liberated. 'While the quantity or loudness of sound-force thus liberated depends generally upon the amplitude of vibration of the sounding instrument, it depends much more upon the sonorous nature or quality of the sounding body itself. It never in any degree, however, depends upon the amount of atmospheric disturbance which the sounding instrument incidentally generates, nor upon the air-waves which it sends off in the form of supposed condensations and rarefactions. This is the great and fundamental error in present acoustical science. The vibrating fork, for example, can produce no possible effect upon the free air, in the shape of condensed pulses, even an inch from the vibrating prong.' Its own swiftest motion counted by inches is small. The vast disparity between the generally credited cause and the frequent result is not explained on the old theory. 'A tuning-fork, whose sound is scarcely audible unless in close proximity to the ear, if heavily struck against a pad, and held at the open mouth of a tube whose air-chamber is of the same vibrational number,

will by synchronism of its sound-pulses sympathetically throw the air-column into vibration; which, in turn, at once liberates more than one hundred thousand times as much sound-force as was produced by the fork alone, as can mathematically be demonstrated, estimating the cubical space which the two sounds will fill' (the *Microcosm*, 1889, Dec.). About 1890 Dr. Hall began to use as a weapon the law of inverse squares of distance. The phenomena of sound (excluding the mental side of the subject, which has no more to do with one physical theory than another) are a crucial test, as well as good illustration, of the theory, for which in all its aspects, scientific and religious, see the *Microcosm* (monthly), and Dr. Hall's *Problem of Human Life, Text-book on Sound;* also the *Scientific Arena,* 2 vols., suspended. The bearing of the theory on immortality is obvious. If all forces are immaterial substance, spirit and life cannot be mere motions of matter, to cease at death.

SUBSTITUTE, n. *sŭb'stĭ-tūt* [L. *substĭtūtus,* put in place of another; *substituĕrĕ,* to put in place of another —from *sub,* under; *statŭō,* I place; *sto,* I stand: F. *substitut,* a substitute]: one put to occupy the place or position of another; one who acts for another; a deputy: V. to put in the place of another; to change; to exchange. SUB'STITUTING, imp. SUB'STITUTED, pp. SUB'STITU'TION, n. *-tū'shŭn* [F.—L.]: act of putting one person or thing in the place of another; in *algebra,* replacement of one quantity or equivalent by another of equal value: in *chem.* (see below). SUB'STITUTIONAL, a. *-ăl,* pertaining to substitution.—SYN. of 'substitute, v.': to barter; change; truck; commute; interchange.

SUBSTITU'TION, in Chemistry: displacing of hydrogen in an organic compound by introducing in its place a radical whether simple or compound. Originally the term substitution was applied only to the process of removing hydrogen from a carbon compound and introducing in its stead a chemically equivalent weight of chlorine, bromine, or oxygen. The substitution of chlorine (Cl) is seen in the following series, in which the four equivalents of hydrogen (H_4) in the carbon compound methane (CH_4) are one by one displaced, till chlorine is substituted for them all:

CH_4	Methane.
CH_3Cl	Chloromethane or methyl chloride.
CH_2Cl_2	Dichloromethane or methylane chloride.
$CHCl_3$	Trichloromethane or chloroform.
CCl_4	Tetrachloromethane or carbon tetrachloride.

The same process is seen when chlorine is substituted for hydrogen in acetic acid:

$HC_2H_3O_2$	Acetic acid.
$HC_2H_2ClO_2$	Chloracetic acid.
$HC_2HCl_2O_2$	Dichloracetic acid.
$HC_2Cl_3O_2$	Trichloracetic acid.

Bromine acts like chlorine on carbon compounds, but iodine never forms S. compounds unless the hydriodic acid resulting from its action is removed as fast as formed: this may be effected by chlorine, by iodic acid, or by mercuric oxide. But besides these chloro-, bromo-, and iodo- substitution compounds, there are nitro-compounds produced by action of concentrated nitric acid: sulpho-compounds from action of sulphuric acid; and methylated, ethylated, propylated, etc., compounds, generally produced by use of the iodides of methyl, ethyl, propyl, etc., e.g.:

Nitro-compounds.

C_6H_6	Benzene.
$C_6H_5NO_2$	Nitrobenzene.
$C_6H_4(NO_2)_2$	Dinitrobenzene.

Sulpho-compounds.

$C_6H_5(HOSO_2)$	Benzene sulphonic acid.
$C_6H_4(HOSO_2)$	Benzene disulphonic acid.

Ethylated compounds.

NH_3	Ammonia.
$NH_2C_2H_5$	Ethylamine.
$NH(C_2H_5)_2$	Diethylamine.
$N(C_2H_5)_3$	Triethylamine.

In the following cases, sulphur is seen substituted in the place of oxygen, phosphorus in the place of nitrogen, and silicon in the place of carbon:

$CH_3.CO.OH$	Acetic acid.
$CH_3.CO.S.H$	Thiacetic acid.
$N(CH_3)_3$	Trimethylamine.
$P(CH_3)_3$	Trimethylphosphine.
$C(CH_3)_4$	Tetramethylmethane.
$Si(CH_3)_4$	Silicon tetramethide.

SUBSTRATUM, n. *sŭb-strā'tŭm* [L. *sub*, under, and *stratum*]: a layer or stratum lying under another; in *metaph.*, the permanent subject of qualities or cause of phenomena. SUBSTRA'TAL, a. *-strā'tăl*, of or pertaining to a substratum.

SUBSTRUCTURE, n. *sŭb-strŭk'tūr* or *-chûr* [L. *sub*, under, and *structure*]: an under-structure or foundation. SUBSTRUC'TION, n. *-shŭn*, an under-building.

SUBSTYLE, n. *sŭb'stīl* [L. *sub*, under, and *style*]: a right line on which the style or gnomon of a dial is erected. SUBSTY'LAR, a. pertaining to a substyle.

SUBSULPHATE, n. *sŭb-sŭl'fāt* [L. *sub*, under, and *sulphate*]: a sulphate with an excess of the base.

SUBSULTUS, n. *sŭb-sŭl'tŭs* [L. *subsilĭō, subsultum*, to leap, to hop—from *sub*, under; *salĭō*, I leap]: in *med.*, a twitching or convulsive motion of the tendons or arteries. SUBSUL'TORY, a. *-tĕr-ĭ*, moving by sudden leaps or starts.

SUBTANGENT, n. *sŭb-tăn'jĕnt* [L. *sub*, under, and *tangent*]: in the *conic sections*, a straight line drawn from a tangent cutting the curve, and intercepted by a straight line drawn from the point of contact of the tangent.

SUBTENANT, n. *sŭb-tĕn'ănt* [L. *sub*, under, and *tenant*]: an individual who occupies land or houses rented from the first tenant.

SUBTEND, v. *sŭb-tĕnd'* [L. *sub*, under, and *tendo*, I stretch]: to extend under, or to be opposite to. SUBTEND'ING, imp. SUBTEND'ED, pp.

SUBTEPID, a. *sŭb-tĕp'ĭd* [L. *sub*, under, and *tepid*]: moderately warm.

SUBTER-, *sŭb'tĕr* [L. *subter*, below, beneath—from *sub*, under]: a prefix, signifying 'beneath' or 'under.'

SUBTERFLUENT, a. *sŭb'tĕr-flō'ĕnt* [L. *subter*, beneath, *fluens* or *fluen'tem*, flowing; *fluĕrĕ*, to flow]: flowing under or beneath.

SUBTERFUGE, n. *sŭb'tĕr-fūj* [F. *subterfuge*—from mid L. *subterfugĭum*, a subterfuge—from L. *subterfugĕrĕ*, to flee by stealth—from *subter*, under; *fugĭō*, I flee]: an artifice employed to escape censure or the force of an argument; a shift; an evasion.—SYN.: prevarication; evasion; quirk; trick; artifice; stratagem.

SUBTERRANEAN, a. *sŭb'tĕr-rā'nĕ-ăn*, or SUB'TERRA'NEOUS, a. *-ŭs* [L. *subterrānĕus*, underground—from *sub*, under; *terra*, the earth]: lying under the surface of the earth; imbedded at some depth in the earth; concealed beneath the surface of the earth; underground. SUBTERRA'NEOUSLY, ad. *-lĭ*.

SUBTILE, a. *sŭb'tĭl* or *sŭt'l* [F. *subtil*, subtle, fine-spun—from L. *subtīlis*, fine, not thick or coarse—from *sub*, under; *tēla*, the threads that run lengthwise in the loom—from *texĕrĕ*, to weave]: thin; not dense or gross; rare delicately constructed; fine. SUB'TILELY, ad. *-lĭ*. SUB'TILENESS, n. *-nĕs*, or SUB'TILTY, n. *-tĭ*, thinness; fineness; refinement. SUB'TILIZE, v. *-īz*, to make fine, thin, or rare; to refine; to spin into niceties; to make nice distinctions. SUB'TILIZING, imp. SUB'TILIZED, pp. *-īzd* SUB'TILIZA'TION, n. *-ĭ-zā'shŭn*, the act of making anything fine or thin; over-refinement.

SUBTLE, a. *sŭt'l* [the same as SUBTILE, which see]: sly, cunning; artful; wily; insinuating; shrewd; acute; in *OE.*, deceitful; acute beyond necessity SUBTLY, ad. *sŭt'lĭ*, slyly; artfully. SUBTLENESS, n. *sŭt'l-nĕs*, or SUBT'LETY n. *-tĭ*, artfulness; slyness; cunning. *Note.*—The spellings *subtile* and *subtle*, in the senses of the preceding two entries, were indifferently employed by good writers of former times. The modern practice is to restrict the senses to the spellings as in the text. In the Eng. Church Service, and formerly in the works of good authors, where the spellings *subtile*, *subtilty*, etc., occur in the derived senses of 'sly, cunning, over-refining,' etc., the pronunciation is *sŭt'l* and *sŭt'l-tĭ*.

SUBTONIC, n. *sŭb-tŏn'ĭk*, or SUBSEM'ITONE [L. *sub*, under, and *tonic*, or *semitone*]: in *music*, the leading note or semitone next below the tonic; the sharp seventh.

SUBTRACT, v. *sŭb-trăkt'* [L. *subtrac'tus*, drawn away from underneath—from *sub*, under; *tractus*, drawn or dragged; *trahĕrĕ*, to draw]: to withdraw or take a part from the rest; to deduct. SUBTRACT'ING, imp. SUBTRACT'ED, pp. SUBTRACT'ER, n. *-ér*, one who subtracts. SUBTRAC'TION, n. *-trăk'shŭn*, art or operation of taking a part from the rest; in *arith.*, the taking a lesser number from a greater (see below). SUBTRAC'TIVE, a. *-tĭv*, tending or having power to subtrac

SUBTRAC'TION, in Arithmetic: one of the four fundamental arithmetical processes; the diminution of a quantity by the removal of a certain portion of it. It is the reverse of *Addition*, and determines how much of any quantity remains after a certain quantity has been taken from it. Where the digits of the number to be subtracted are greater than the corresponding digits of the number to be diminished, two methods of operation may be adopted.

(1)	(2)	(3)
7324	7 (13) (12) 4	6 (12) (12) 4
1842	(2) (9) 4 2	1 8 4 2
5482	5 4 8 2	5 4 8 2

E.g., in subtracting 1842 from 7324, the numbers are written as in form (1). A usual method is to make an addition mentally to the upper figure when necessary, and then compensate for this by an equivalent addition to the next under figure, as represented in form (2). Thus, 10 'tens' are added to 2 'tens,' to enable 4 'tens' to be subtracted, and this addition is compensated for by an equal increase of the under line by 1 'hundred,' through the change of 8 'hundreds' into 9 'hundreds.' The more simple and directly intelligible plan, shown in form (3), is to borrow a unit of the next higher degree in the upper line, care being taken to remember, in the partial subtraction immediately succeeding, that the upper digit must be considered as less by unity than it appears.

SUBTRAHEND, n. *sŭb'trā-hĕnd* [L. *subtrahendus*, requiring to be subtracted—from *sub*, under; *traho*, I draw], the sum or number to be subtracted or taken from another.

SUBTRANSLUCENT, a. *sŭb'trăns-lō'sĕnt* [L. *sub*, under, and *translucent*]: imperfectly translucent.

SUBTRANSPARENT, a. *sŭb'trăns-pā'rĕnt* [L. *sub*, under, and *transparent*]: imperfectly transparent.

SUBTRIPLE, a. *sŭb-trĭp'l* [L. *sub*, under, and *triple*], containing a third, or one part of three. SUBTRIPLICATE, a. *sŭb-trĭp'lĭ-kāt* [*sub* and *triplicate*]: indicating the ratio of the cube roots.

SUBULATE, a. *sū'bū-lāt*, or SU'BULATED, a. [L. *sūbŭla*, an awl]: in *bot.*, shaped like an awl; narrow and tapering.

SUBUNGUAL, a. *sŭb-ŭng'gwăl* [L. *sub*, under; *unguis*, a nail]: under the nail or the claw.

SUBURB, n. *sŭb'ėrb*, plu. SUB'URBS, *-ėrbz* [L. *sub*, under near; *urbs* or *urbem*, a city]: the parts of a city without the walls; the outskirts or underlying parts of a city or town; the confines. SUBURBAN, a. *sŭb-ėr'băn*, inhabiting or being in the suburbs of a city.

SUBVENTION, n. *sŭb-vĕn'shŭn* [L. *subvenīrĕ, subven'tum*, to come to one's assistance—from *sub*, under; *venīrĕ*, to come]: the act of coming under; a government grant or aid; a subsidy.

SUBVERSION, n. *sŭb-vėr'shŭn* [F. *subversion*—from L. *subversus*, turned upside down—from *sub*, under; *vertĕrĕ*, to turn]: an entire overthrow; destruction; ruin; downfall. SUBVER'SIVE, a. *-sĭv*, tending to subvert or overthrow.

SUBVERT, v. *sŭb-vert'* [L. *subvertĕrĕ*, to turn upside down—from *sub*, beneath; *verto*, I turn: F. *subvertir*]: to overthrow; to ruin utterly; to destroy. SUBVERT'ING, imp. SUBVERT'ED, pp. SUBVERT'ER, n. *-ėr*, one who subverts. SUBVERT'IBLE, a. *-ĭ-bl*, that may be subverted.—SYN. of 'subvert': to destroy; invert; extinguish; reverse; overturn; corrupt; confound.

SUBWAY, n. *sŭb'wā* [L. *sub*, under, and *way*]: an underground way for passengers, freight, telegraph and telephone wires, etc. The first subway on record, for railway passenger purposes was begun in London in 1853, with two tracks. This eventually became two lines. In 1886 an English engineer, J. H. Greathead, constructed a circular section line with cast iron. It was intended for steam power, but became an electric road. Shortly afterwards the problem of underground passenger transportation was taken up in New York, Boston, Paris, Berlin, and Budapest. A subway was started early in the 90's at Budapest. It began to operate in 1893. Then came a three-mile line in Boston. This was followed by lines in Glasgow and Berlin.

In 1898 a plan was perfected by the authorities at Paris, and their engineers, to cover, practically, the whole area of that city. In 1900, after a thorough investigation of systems in other cities the first New York subway was undertaken. The subway idea, although first talked of and roughly planned in 1868 did not develop into anything like practical shape until the passage of a bill in 1888 at the instigation of Mayor Hewitt. A rapid transit commission was formed in 1894. Contracts for a subway were signed on January 15, 1900. Ground was broken opposite the City Hall on March 24, 1900, and twenty miles were thrown open to the public on Oct. 27, 1904. This New York subway as planned cost $40,000,000, the cost of equipment alone being $18,000,000. Since the opening, in 1904, extensions have been made, and other extensions are now in progress. The structure as it now stands contains over 60,000 steel beams and girders, and employs over 4,000 persons in various capacities. The latest development of the New York subway, 1906–7, adds several more routes in New York and Brooklyn. Subways or tunnels are also under construction and in some instances nearly perfected be-

neath both the North and East rivers. At least a dozen structures of the kind are being built or been projected and approved.

SUCCEED, v. *sŭk-sēd'* [F. *succéder*—from L. *succēdĕrĕ*, to follow after, to succeed—from *sub*, under or after; *cēdo*, I go: It. *succedere*]: to follow or come after; to take the place which another has left; to obtain the object desired; to have the desired effect; to prosper. SUCCEED'ING, imp.: ADJ. following in order; taking the place of another; having success: N. act of one who, or that which, succeeds; in *OE.* consequence; result. SUCCEED'ED, pp.

SUCCENTOR, n. *sŭk-sĕn'tĕr* [mid. L. *succentor*, an accompanier—from L. *sub*, under; *cantor*, a singer—from *cano*, I sing]: in a church choir or concert, one who sings the bass or lowest harmonized part; in cathedral churches, the precentor's deputy; in *OE.*, a prompter; an inciter.

SUCCESS, n. *sŭk-sĕs'* [F. *succès*—from L. *successus*, a happy issue, success—from *succēdo*, I succeed (see SUCCEED): It. *successo*]: a happy or favorable issue; the prosperous termination of anything attempted; issue; result. SUCCESS'FUL, a. *-fŭl*, prosperous; fortunate. SUCCESS'FULLY, ad. *-lĭ*. SUCCESS'FULNESS, n. *-nĕs*, the condition of being successful.

SUCCESSION, n. *sŭk-sĕsh'ŭn* [F. *succession*—from L. *successĭō* or *successĭōnem*, succession—from *succēdĕrĕ*, to succeed (see SUCCEED)]: series of persons or things following one another either in time or place; act of succeeding or coming in the place of another; race; lineage; act or right of taking an inheritance: in *Scotch law*, the taking of property by one person in place of another: see HEIR, in Scotch Law: HEIRS-PORTIONERS: HEIR, at Law. SUCCES'SIONAL, a. *-ăl*, denoting a regular order or succession. SUCCES'SIONALLY, ad. *-lĭ*. SUCCES'SIVE, a. *-sĕs'sĭv*, following in an uninterrupted course; coming by succession; in *OE.*, inherited by succession. SUCCES'SIVELY, ad. *-lĭ*, in uninterrupted order; one after another. SUCCES'SIVENESS n. *-nĕs*, the state of being successive. SUCCES'SOR, n. *-sĕr*, one who succeeds to, or follows in the place of, another. APOSTOLIC SUCCESSION, uninterrupted transmission of ecclesiastical authority, by regular ordination through a succession of bishops (and through them of priests and deacons), from the apostles: claimed by the Rom. Cath., the Greek, and oriental churches; and maintained by the Anglican and the Prot. Episc. churches as historical, and in general and virtually, though not universally, maintained as essential to valid transmission of clerical orders. SUCCESSION DUTY, in *Great Britain*, a tax imposed on every succession to property, whether real or personal, according to its value and the relation of the person who succeeds.

SUBWAY.

1. Air Lock Construction.
2. Rings and Erector.

SUCCESSION ACTS: in English History, acts of parliament on various occasions, limiting or modifying the hereditary succession to the throne. The earliest instance of such interference was in the reign of Henry IV., who possessed himself of the crown, to the exclusion of the descendants of Lionel, Duke of Clarence, second son of Edward III., and who was confirmed in his title by parliament. Parliamentary interposition was subsequently exercised in the case of Henry VII., and in regard to the immediate successors of Henry VIII. The respective rights of James I., Charles I., and Charles II. were acknowledged by parliament; and in the case of Charles II. the crown was held by parliament to have devolved on him immediately on the death of his father.

The revolution of 1688 was founded on the so-called abdication of the government by James II. See ABDICATION. The convention bestowed the crown on William and Mary for life, and regulated the claims of Anne. On the impending extinction of the Prot. descendants of Charles I., the crown was settled by 12 and 13 Will. III. c. 2, in event of the death of William and Anne without issue, on the next Prot. line, according to the regular order of succession—viz., the descendants of Electress Sophia of Hanover, granddaughter of James I.; and it was at the same time enacted, that thenceforth whoever should come to possession of the crown, should join the communion of the Church of England as by law established. This is the latest parliamentary limitation of the crown; but the right of parliament to limit the succession has been secured by 6 Anne, c. 7, which attaches the penalties of treason to the 'maliciously, advisedly, and directly' maintaining, by writing or printing, that the king and parliament cannot make laws to bind the succession to the crown, and the penalties of a *Præmunire* to maintaining the same doctrine by preaching, teaching, or advisedly speaking.

SUCCESSION, APOSTOLIC: the transmission, through the episcopate, of the power and authority given by Christ to his apostles for the governance of his church. Theologians of the Catholic church and of the Anglican High Church maintain that those sects which are without apostolic succession, that is, which separated from the Catholic church without retaining bishops regularly ordained and consecrated, have, strictly speaking, neither church nor sacraments, nor divine mission to teach their people the truths of the Christian religion. Catholic theologians hold further that apostolic succession by itself does not involve the authority to teach, to rule the church, to administer the sacraments; that when, for example, a national church goes out of the communion of the Church Catholic, though it have duly consecrated bishops, and duly ordained clergy, by being severed from the Church Catholic it loses jurisdiction, mission, right to exercise the powers of priesthood and episcopacy; its

bishops and priests are in a situation resembling that of a bishop or a presbyter who is suspended or excommunicated. See BISHOP; ORDINATION; CATHOLIC CHURCH.

SUCCESSION POWDER (from the French *Poudre de Succession*): a secret poisonous powder formerly prepared to a great extent in Italy and France, to kill people slowly, so that their heirs might succeed (hence the name) to their property and personal estate. Private enmities also found this powder a ready and secret means for satisfying the treacherous desire for revenge. The composition of the powder has never been definitely established.

The horrible art of secret poisoning never excited more attention throughout Europe than about the year 1670, when the extent of the crimes of Marie d'Aubray, Marquise de Brinvilliers, became known; the secret poisonings of Cesare Borgia also are notorious. Eleven years before the revealing of Madame de Brinvilliers' crimes, a numerous society of young women had been discovered in Rome, in 1659, who, under the direction of an old woman of the name of Hieronyma Spara, had administered poison to many people among the highest classes, to rid wives of their husbands, and husbands of their wives, children of their parents, jealous lovers of their rivals, etc. The history of these particular crimes, with many details of a painful character, may be found in Beckmann's *History of Inventions, etc.*, translated by Johnson (Vol. I., division *Secret Poisons*).

Though the times have passed when poisoning as an art was habitually practised, yet secret poisoning even in modern times is carried on to an inconceivable extent.

SUCCESSION WARS: struggles frequent in Europe, between the middle of the 17th and the middle of the 18th c., on the occasion of the failure of a sovereign house. The most important of these wars were—that of the Orleans succession to the Palatinate (1686-97), closed by the peace of Ryswick; of the Spanish succession (1700-13); of the Polish succession (1733-38), closed by the peace of Vienna; of the Austrian succession (1740-48); and of the Bavarian succession (1777-79), called, in ridicule, the Potato-war. Of these, the second and fourth were by far the most important; and a notice of them is subjoined.

WAR OF THE SPANISH SUCCESSION. This arose on the death, without issue or collateral male heirs, of Charles II., King of Spain, 1700, Nov. 3. The nearest natural heir to the throne was of the royal line of France, Charles's elder sister having married Louis XIV.; but to prevent any possible union of the two crowns, a solemn renunciation had been exacted both from Louis and his queen, for themselves *and their heirs;* and this renunciation having been ratified by the king and cortes of Spain, was made as binding as law could make it. Failing the

Bourbons, the next heirs were the descendants of the younger sister of Charles, who had married the emperor Leopold I., and from whom no renunciation had been exacted; and the only issue being a daughter, who had married the Elector of Bavaria, and borne a son, Joseph-Ferdinand, this prince was during his lifetime regarded both by Charles II. and by the Spanish people as the rightful heir. But as he died 1699 without issue, the question of succession was reopened, Louis XIV., failing his wife's rights, claiming it for himself, as the son of Philip IV.'s elder sister (being, however, again legally barred here by another solemn renunciation); while Emperor Leopold, maintaining with justice that the Bourbons were by these two renunciations wholly deprived of their rights of heirship, claimed the throne as the son of Philip IV.'s younger sister. The other powers of Europe, especially Britain, Holland, and Germany, interested themselves in the matter, as a question of policy, and with good reason; for not only was the crown of Spain a valuable prize in itself, carrying with it the sovereignty of the Netherlands, the Milanese, Naples and Sicily, and immense possessions in America, but also its union with France or Austria would endanger the independence of every other sovereignty in Europe. Both claimants bade for the support of the maritime powers—one by renouncing his claims in favor of his second grandson, Philip of Anjou; the other by putting forward his second son, Charles, as his substitute; while both solemnly promised never to undertake the union of the two crowns. The Austrian party at first preponderated in Spain; but Louis, by unscrupulous policy, undermined the Austrian influence at Madrid, and Philip was declared the heir 1700, Oct. 2. On the death of King Charles, Philip appeared in Spain, and was well received and at once recognized as monarch, an example gradually and unwillingly followed by all the European powers except the emperor; for at that time the dread of Louis XIV.'s power pressed like an incubus on Europe. However, the French monarch, by various ill-advised acts, chiefly by his support of the elder Pretender (son of James II.), whom he recognized as sovereign of Britain, and by occupation of the Netherlands and menacing treatment of Holland, stirred up such general resentment, that William III. was enabled to revive the *Grand Alliance*, and his successor, Anne, to join with Holland and Austria in declaring war against France and the 'Spanish usurper,' 1702, May 15.

Hostilities at once began: a combined British-Dutch-German army under Marlborough attacked the French in Belgium, and captured one by one their fortresses on the Maes, while the Reichs army (Germany having declared for Austria), under the Markgraf of Baden, crossed the Rhine, and took Landau. Austria had begun the contest in the previous year, by sending into Italy Prince Eugene (q.v.) of Savoy-Carignan, at the head of a veteran army of 32,000 men. Meanwhile, the Elector of Bavaria raised an army and declared for France; and a French army under

Villars joined him, but returned to France (1703). In the Low Countries, Marlborough took from the French their strongholds: in Italy, the Austrians lost heavily, but were relieved by the defection from France of the Duke of Savoy, who joined the grand alliance 1703, Oct. 25. The first great blow was struck 1704, when the combined Austrian German-British army, under Marlborough, totally defeated the French and the Elector at Blenheim (q.v.), driving the debris of their forces almost to the foot of the Vosges. After this the French never gained permanent footing in Germany. The campaigns of Marlborough in Germany, and of Eugene in Italy, 1705, were successful but not important. In 1706 the British and Dutch had forced the French into S. Brabant, and Marlborough having, by stratagem, caused them to march toward Namur, suddenly attacked them at Ramillies (q.v.), and put them to rout with great slaughter, the elector and Villeroy, the joint commanders, narrowly escaping capture. Louis hastily reinforced his army, and recalled Vendome from Italy to take the command—a step which cleared the way for Eugene, who completely out-generalled his opponent Marsin, and after a memorable march of 34 days, appeared before Turin, and united with the Duke of Savoy. The battle of Turin, in which the gallant Marsin was slain, was one of the most obstinate of the whole war; but its result was decisive; the French power in n. Italy was shattered; and the following year saw the country completely cleared of French and Spaniards. From 1706 the war in Germany was purely defensive, and with no notable battle. In Italy the Austrian arms were mostly successful, Mantua and Naples (1708) being subdued, and the pope compelled to neutrality by dread of another sack of Rome. But since the beginning of 1704, another theatre of war had been established by the landing of the Archduke Charles at Lisbon with 8,000 British and 6,000 Dutch troops, who were joined by the Portuguese, and invaded Spain; and when the Earl of Peterborough (q.v.), with a small body of troops landed in Catalonia, the Bourbon forces, attacked from both the e. and the w., were driven across the Pyrenees. After Peterborough's departure Berwick (q.v.) made head against his antagonists, and by his victory at Almanza (1707, Apr. 25), recovered the whole of Spain except Catalonia. In 1710 Berwick finally left Spain; and the Carlists under Stanhope and Starhemberg regained power, repossessing themselves of e. Spain, and of Madrid (Sep. 28). On the arrival of Vendome, Stanhope was defeated and captured (Dec. 9) at Brihuega, and Starhemberg was forced to retreat. Meanwhile the most important struggle had been in the Netherlands, where Marlborough (1707) drew up in concert with Eugene a secret plan of operations which effected a division of the Moselle army under the elector and Berwick from that of the n. under Vendome; whereupon the British and Germans swiftly uniting fell upon Vendome's army at Oudenarde (q.v.) (1708), and defeated it severely before Berwick could come to its aid.

The capture of Lille, Ghent, and Bruges followed. France now began to show exhaustion, and made overtures of peace; but these being chiefly illusory, were rejected; and the emperor having largely reinforced Eugene, the allies took the field with 110,000 men, while the French, equal in strength, were directed by Villars, their most enterprising general; but his star fell before that of Marlborough at Malplaquet (q.v.) (1709, Sep.). The opportune death of the emperor (1711, Apr. 17) rescued France from the brink of destruction; for Britain became immediately lukewarm in support of a cause which would effect the reunion of Austria and Spain; and the tories having come into power, private preliminaries of peace were signed between Britain and France, 1711, Oct. 8. Eugene, however, continued the war, aided by Holland, and captured Quesnoy; but the defeat and capture of the Earl of Albemarle and the British contingent at Denain, 1712, July, compelled Eugene to give way; and in the following spring the Dutch joined the British as parties to the peace of Utrecht (q.v.). Emperor Charles also was forced to conclude a treaty of peace at Baden, 1714, Sep. 7, which ended the struggle, leaving Philip in possession of the Spanish throne (see UTRECHT, PEACE OF); while Austria obtained the Spanish Netherlands and the Milanese.

WAR OF THE AUSTRIAN SUCCESSION. The death of Emperor Charles VI. (1740, Oct. 20), by which the male line of the House of Hapsburg became extinct, was the signal for a general uprising of the powers of Europe, some to prey on the Austrian possessions, others to aid the eldest daughter and heir of the deceased emperor. This contingency had long been provided for by Charles VI., for as early as 1713 he had published a *Pragmatic Sanction* (q.v.), stipulating that, in default of male heirs, the whole of his dominions should descend undivided to his eldest daughter, Maria Theresa (q.v.). This arrangement gained general consent—the Elector of Bavaria, Charles-Albert, alone refusing to resign his pretensions. Maria Theresa, on the death of her father, intimated her accession to the various European powers, and from all except France and Bavaria received assurances of good-will; but two months did not elapse till Frederick II. of Prussia, without declaration of war, invaded Silesia. The Austrian treasury was exhausted, and the army disorganized; while the alarm into which this sudden attack had thrown the court of Vienna was increased by doubts as to the intentions of France. These doubts were soon resolved by France, in the spring of 1741, forming a confederacy of all the claimants to the Austrian dominions—the electors of Bavaria and Saxony, sons-in-law of Emperor Joseph I.; Philip V. of Spain; Charles Emmanuel of Sardinia, who claimed the Milanese; and Frederick II. of Prussia, who *now* demanded almost the whole of Silesia. On the other hand, Britain granted Maria Theresa an annual subsidy of £300,000; the Dutch were willing to aid her; and Hungary gallantly responded to her pathetic appeal by sending her motley population in thousands—Magyars, Croats, Slavs, and

Tolpatches, to defend their heroic queen. Meantime the Bavarians, with the French under Belleisle, overran Bohemia. Their invasion compelled the queen to buy off her most formidable opponent, Prussia, by surrender of Silesia and Glatz; then, while Prince Charles of Lorraine kept the French at bay in Bohemia, Khevenhuller, most enterprising of the Austrian generals, advanced up the valley of the Danube, captured 12,000 French in Lintz, overran Bavaria, and on the very day of the elector's coronation as Emperor Charles VII., took Munich his capital (1742, Feb. 12). But this great success alarmed Frederick II. for the security of his new possessions, and abruptly breaking the treaty, he poured his forces into Bohemia and Upper Austria, and gained the battle of Chotusitz (May 17) The same year witnessed the expulsion of the French and Bavarians from Bohemia; the severance of the king of Sardinia from the coalition against Austria; the enforcement of neutrality on Naples by the threatening attitude of a British fleet off the capital; and, on the other hand, the recovery of Bavaria by the elector.

1743, May, Bavaria again fell into the hands of Prince Charles and Khevenhuller; Count Saxe was driven from the Palatinate; 'Emperor' Charles-Albert and the Swedes, disgusted at their ill-success, retired from the contest, so that France and Spain remained sole representatives of the once mighty coalition. In 1744 France and Britain, hitherto engaged in the conflict only as allies, declared war on each other; and Britain destroyed piecemeal the French and Spanish shipping on the high seas, and attacked their colonial possessions. For this, however, the successes of Saxe in the Netherlands were a compensation. But the great successes of Austria on the Rhine, and the ambitious projects of Maria Theresa, again alarmed Frederick II. for Silesia; and he concluded at Frankfurt 1744, May 13, a secret convention with France, the emperor, the elector-palatine, and the king of Sweden Bursting into Bohemia, Frederick II. forced the Austrians to return from Alsace, thus enabling the elector to recapture Bavaria; but before Prince Charles had time to reach Bohemia, a fresh levy of 44,000 chivalrous and patriotic Hungarians, joined by 6,000 Saxons, had reached the Prussians, cut off their supplies, and compelled them to evacuate the kingdom. In Italy the Spaniards, joined by the Neapolitans, were defeated, and compelled to retreat down the peninsula: and the king of Sardinia prevented the French from effecting permanent lodgment in n.w. Italy. 1745, Jan., the emperor-elector died, and his son, Maximilian-Joseph, profiting from his father's misfortunes, declined to take part in the contest, or to allow himself to be nominated emperor, and made peace with Austria. Frederick II., displeased with the overbearing conduct of France respecting the approaching imperial election, also sought terms with Austria by the mediation of Britain; and the peace of Dresden, 1745, Dec. 25, withdrew Prussia from the conflict. In Flanders, after the victory of Fontenoy, 1745, May 11, Saxe captured the chief Belgian fortresses In Italy, the

Spanish-Neapolitan army, reinforced by the Genoese and Modenese—70,000 men in all—overran Lombardy and much of the Sardinian territories. Similar reverses befel the allies in Flanders 1746; but these were more than counterbalanced by the great successes in Italy, where the lost fortresses were recaptured, the coalition army routed in a great battle near Placentia (June 16), and Genoa occupied. A favorable event to Austria was the death of Philip V. of Spain (July 9), which, by depriving that archplotter, his queen, of the supreme power, diminished the zeal of the Spanish court in the contest. In 1747 the Dutch felt the ravages of the war: Saxe, having subdued the Austrian Netherlands, overran Dutch Flanders, and routed the unfortunate Duke of Cumberland at Laffeldt (July 2), while his chief of engineers, Count Lowendal, after two months' siege, took Bergen-op-Zoom, Cohorn's masterpiece, a fortress believed by the Dutch to be impregnable. Early in 1748, Britain, France, and Holland sought a peace, and agreed to preliminaries, which were submitted to Austria and Sardinia. Austria at first refused them; but after her two allies, in disgust of her disregard of their sacrifices, had signed them (Apr. 30), Austria sullenly followed (May 8). Much discussion followed; but 1748, Oct. 18, the treaty of Aix-la-Chapelle (q.v.) ended this most disastrous war, which left the Hapsburgs in possession of their hereditary dominions except Silesia and some of their Italian provinces.

SUCCINIC, *sŭk-sĭn'ĭk* ACID, amber acid, C_2H_4 $(CO\text{-}OH)_2$, was first obtained by Agricola (1657) by distillation of amber. It occurs in lignite, in many varieties of plants, in the urine of many animals, and in small quantities in the products of the fermentation of sugar. It is usually prepared by the oxidation of fats with nitric acid or by fermentation of calcium malate. A colorless crystalline substance with no odor and a slightly acrid taste; soluble in water or alcohol; heated to boiling point, 235° C., it slowly loses water, forming the anhydride $C_2H_4(CO)_2O$. It is a dibasic acid forming salts and many other derivatives. The sodium salt has been used in cases of catarrhal jaundice and gall-stones. The other derivatives are of interest only to the synthetical chemist.

SUCCINCT, a *sŭk-sĭngkt'* [F. *succinct*, concise—from L. *succinctus*, prepared, short—from *sub*, under; *cinctus*, girded; *cingĕrĕ*, to gird: It. *succinto*]: shortened; compressed into a narrow compass; brief; concise; in *OE.*, tucked or girded up; having the clothes drawn up slightly from about the legs. SUCCINCT'LY, ad. *-lĭ*, briefly; concisely. SUCCINCT'NESS, n. *-nĕs*, brevity; conciseness.—SYN. of 'succinct'; brief; short, summary; compendious; terse.

SUCCISE, a. *sŭk-sīs'*, or SUCCISUS, a. *sŭk-sī'sŭs* [L. *succīsus*, lopped off; *succīdo*, I lop off—from *sub*, under; *cædo*, I cut]: in *bot.*, appearing as if a part were cut off at the extremity; premorse,

SUCCOR, or SUCCOUR, v. *sŭk'kêr* [L. *succur'rĕrĕ*, to hasten to the aid or assistance of a person—from *sub*, under; *curro*, I run: F. *secourir;* It. *soccorrere*. to succor]: to help when in want or distress; to assist; to aid; to relieve; to be a remedy to or for: N. help; aid; assistance; assistance that relieves from want or distress; the person or thing that brings relief. SUC'CORING, imp. SUC'CORED, pp. *-kêrd*. SUC'CORER, n. *-êr*, a helper SUC'CORLESS, a. *-lĕs*, destitute of help or relief.—SYN. of 'succor, v.': to help; deliver; cherish; comfort.

SUCCORY, n. *sŭk'kêr-ĭ* [corrupted from CHICORY, which see]: chicory or wild endive: see CHICORY.

SUCCOTH, or SUKKOTH, *sŭk'oth* [Heb., booths]: ancient town of the Holy Land, of uncertain location, but identified by some with ruins e. of Jordan, near the junction of the Wady Zerka (Jabbok) with that river. The first mention of it is after the meeting of Jacob and Esau (Gen. xxxiii.), Jacob journeying to the place and building booths for his cattle—whence the name. In the time of the judges (Judges viii.), Succoth had princes and 77 elders, whom Gideon beat with thorns, because they refused him bread when he was pursuing the Midianites.—Another Succoth (Gen. xiii. 20) was the first camping-place of the Israelites in their flight from Egypt, and is supposed to have been about 15 m. e. of Rameses.—*Succoth-benoth* (II Kings xvii. 30) was the name of a Babylonian god, set up in Samaria; but it appears to have had no connection with the place Succoth.

SUCCULENT, a. *sŭk'kū-lĕnt* [F. *succulent*—from mid. L. *succulen'tus*, juicy—from L. *succus*, juice, sap]: full of juice—applied to plants that have juicy and soft stems or leaves; soft and juicy. SUC'CULENTLY, ad. *-lĭ*. SUC'CULENCE, n. *-lĕns*, or SUC'CULENCY, n. *-lĕn-sĭ*, juiciness. SUCCULENT PLANTS, plants remarkable for the thick and fleshy or juicy character of their stems and leaves. This character prevails in the nat. orders *Cactaceæ*, *Mesembryaceæ*, and *Crassulaceæ*, but appears frequently also in genera of other nat. orders, e.g., aloes and some other *Liliaceæ*. It consists in a peculiar development of cellular tissue. Succulent plants are notable for the small number of Stomata (q.v.) on the green surface. They are generally found in dry climates, often as almost the only vegetation of the most arid places; though some of them occur in situations where moisture is often abundant. Thus, there are not only succulent plants in the Sahara and other deserts, but some of them are conspicuous in the flora of the mountains of Europe—e.g., species of *Sedum*, *Rhodiola rosea*, etc.—growing on bare rocks, steep slopes with scanty soil, and the like. The lack of stomata and the store of moisture in their own cellular tissue adapt them to endure long droughts. Yet they live in great part by

nourishment from the atmosphere, rather than from the soil; as is seen in the flourishing growth of the Common Yellow Stonecrop (*Sedum acre*) suspended by a string. In dry tropical countries, succulent plants perform in part the office of lichens and mosses in colder regions, in preparing the first mold for vegetation.

SUCCUMB, v. *sŭk-kŭm'* [L. *succum'bĕrĕ*, to lie down beneath, to submit to—from *sub*, under; *cumbo*, I lie]: to sink under, as trouble; to submit; to yield. SUCCUMB'ING, imp. SUCCUMBED', pp. *-kŭmd'*.

SUCCURSAL, a. *sŭk-kĕr'săl* [L. *succur'sus*, aided, assisted; *succur'rĕrĕ*, to aid—from *sub*, under; *curro*, I run] associated and tributary; additional and aiding.

SUCCUS, n. *sŭk'ŭs*, n. plu. SUCCI, *sŭk'sī* [L., juice]: in *pharm.*, expressed juice of a plant intended to be used medicinally.

SUCCUSSION, n. *sŭk-kŭsh'ŭn* [L. *succussus*, a shaking, a jolting—from *sub*, under; *quatĭō*, I shake]: the act of shaking; a shake; in *med.*, an ague.

SUCH, a. *sŭch* [a corruption of So and LIKE, which see: Goth. *svaleiks*, so like: AS. *swylc;* OHG. *solich;* Ger. *solch*, such]: of that kind; the same that; like what has been said; referring to time, place, etc., already mentioned; very great; considerable. SUCH LIKE, similar; of a like kind; so forth. SUCH AND SUCH, referring to a person or place of a certain kind.

SUCHET, *sü-shā'*, LOUIS-GABRIEL, Duke of Albufera, Marshal of France: 1770, Mar. 2—1826, Jan. 3; b. Lyon; of honorable family. He volunteered as a private in the cavalry of the Lyon national guard 1792, and afterward was attached to the army of Italy. His rare intelligence and brilliant valor, at Lodi, Rivoli, Castiglione, Arcola, and other battles, gave him military reputation, and 1798 he became gen. of brigade. He performed one of the most brilliant military feats on record when, with a force not one-sixth of that of the Austrians, he kept Melas in check (1800), preventing the invasion of s. France, and ultimately capturing 15,000 prisoners. In 1799 he was made gen. of division under Joubert in Italy; in 1800 second in command under Masséna. S. took distinguished part in the campaigns against Austria (1805) and Prussia (1806), and was subsequently (1809) appointed generalissimo of the French army in Aragon, where first he appears in independent command. The most obstinately patriotic district in Spain was completely subdued, more, however, through his just and able administration and strict discipline than by military prowess. He had need of prowess against only the Spanish troops, and these he had little difficulty in annihilating. In the first few days of 1812 he conquered Valencia, and then obtained in addition to his dignity of marshal (1811) that of Duke of Albufera, and the grant of a magnificent domain. His five campaigns in the Peninsula are models of the kind of service that he had to perform—viz., to rivet the chains of a foreign domination on a patriotic and spirited people.

For details, see his *Memoires sur ses Campagnes en Espagne* (Paris 1829-34, 2 vols. with atlas). But the disasters of the other French armies in Spain compelled Suchet gradually to relinquish all his conquests. He was created a peer by Louis XVIII., but took service under his old master after his return from Elba, and was charged with the defense of the s.w. frontier. Deprived of his peerage at the second restoration, he did not return to court till 1819, when it was restored, and he soon rose high in royal favor. He died at the chateau of Saint-Joseph, near Marseille. Napoleon's high opinion of Suchet's military talents is recorded by O'Meara and Las Casas—ranking Suchet second, Massána being first. —His son and successor in the dukedom of Albufera was a member of the corps législatif and a supporter of the Napoleonist policy under Napoleon III.

SU-CHOW, *sô-chow'*: city in the province of Kiang-su, China; on the great imperial canal; 55 m. w.n.w. of Shanghai. It was founded A.D. 484, is one of the most substantially built cities in the world, and was formerly one of the largest. It is intersected by numerous canals; contains a marvellous 9-storied pagoda; and is a great commercial and manufacturing centre. Pop. 500,000.

SUCK, v. *sŭk* [Ger. *saugen;* Dan. *suge;* Sw. *suga;* W. *sugno,* to suck: Gael *sùg,* to suck; *sùgh,* juice: L. *sugĕrĕ,* to suck]: to draw from the teat of a female with the mouth; to draw with the mouth; to draw into the mouth, as milk; to imbibe; to draw or drain; to draw in; to inhale: N. the act of drawing with the mouth; milk drawn from the breast with the mouth by an infant. SUCK'ING, imp.: N. the act of drawing from, as with the mouth. SUCKED, pp. *sŭkt.* SUCK'ER, n. *-ĕr,* he who or that which sucks; a round piece of leather used by boys to lift stones with; the piston of a pump; the shoot of a plant from the root, or near to it. SUCKET, n. *sŭk'ĕt,* a sweetmeat. SUCKING-BOTTLE, a bottle filled with milk, having a tube, used for infants as a substitute for the breast. SUCKING-FISH, a fish of the genus *Remŏrā, which bears a* sucker-like organ. SUCKLE, v. *sŭk'l,* to give suck to; to nurse at the breast. SUCK'LING, imp. *-lĭng:* N. a young child or animal brought up by the mother's milk; an infant. SUCKLED, pp. *sŭk'ld.*

SUCKER STATE, THE: a popular nickname for the state of Illinois, whose inhabitants are sometimes dubbed 'suckers' by their fellow citizens of neighboring states. The following is the reputed origin of the epithet:

The w. praries are full of the holes made by the crayfish, which burrows to reach the water beneath the soil. In the early days of the country's settlement travelers armed themselves with slender hollow reeds, which they thrust, when thirsty, into these natural reservoirs, and thus easily supplied their longings by sucking the water through the reed or pipe.

SUCKERS: soft-rayed teleostomous fishes of the genus *Catostomus* and related genera belonging to the family *Catostomidæ*. The family is extremely characteristic of the fresh waters of North America, where all but two of the 60 or more species are found, replacing in our fauna the carps of the Old World. The 14 recognized genera include, besides the suckers proper, the blackhorse and redhorse, the buffalofish, the jumping mullet, and the white mullet. Many of these fishes exhibit migratory habits recalling the anadromous marine fishes, moving regularly in the spring from ponds and lakes into the fresher waters of brooks to spawn. As examples of this large group the following may be selected: The common or white sucker, *Catostomus teres*, reaches a length of 15 to 18 inches, has thick protusible lips with two or three rows of papillæ, about 65 scales along the lateral line and a rather short dorsal fin. The color is dusky above, light olivaceous on the side, tinged in the spring with rosy hues. This species is exceedingly common in rivers, mill-dams, ponds, etc., throughout the entire e. half of the United States. Early in the spring, as soon as the ice is out of the streams, this species leaves the larger bodies of water and deep holes and seeks the swift running brooks, up which large schools migrate until stopped by some obstruction, to deposit their spawn in the upper stony shallows. At this season they take the hook eagerly, especially when baited with earthworms; but they are listless, lazy fishes and never afford any real sport nor good eating, except for a short time in early spring. In the summer they are soft and tasteless. Many are captured in small nets at sluiceways, etc., or even in the hands by boys who wade in the streams and feel for them under overhanging banks. Hog-sucker, stone roller (*C. nigricans*) are some of the names of a considerably larger species, with larger scales, found plentifully in the lakes and clear swift streams of much the same region. Its habits are similar and favorite methods of capture are spearing and noosing with fine copper wire or horsehair. Other related species are the carp-sucker or sail-fish (*Ictiobus velifer*) of the Mississippi Valley, the carp-sucker of the Susquehanna river (*I. cyprinus*), the chub-sucker (*Erimyzon sucetta*), and the striped sucker (*Minytrema malanops*) of the Great Lakes and Mississippi Valley. Consult Goode, *American Fishes* (New York, 1888).

SUCK'ING-FISH: name sometimes given to the Remora, and to fishes of the family Discoboli, which have a sucker formed by union of the ventral fins, and are capable of attaching themselves by it to stones or other substances. One of the best-known species, the only one of value as food, is the Lumpsucker (q.v.). Several other species are popularly named SUCKER—e.g., the CORNISH SUCKER (*Lepidogaster Cornubiensis*) and the UNCTUOUS SUCKER or Sea-snail (*Liparis vulgaris*).

SUCKLING, *sŭk'ling,* Sir JOHN: one of the brilliant cavalier poets of the court of Charles I.: 1609—about 1642; b. Whitton, in Middlesex. His father, also a knight, held office as sec. of state, and comptroller of the household. Suckling in his 18th year, at his father's death, inherited large estates; completed his education at Trinity College, Cambridge; went abroad, and served in Germany under Gustavus Adolphus. He returned about 1632, and was soon distinguished for his wit, gallantry, and lavish expenditure. To aid Charles I. against the Scots, he raised a troop of 100 horsemen, whom he clad in a rich and gaudy uniform of white and red, with red plumes in their caps: this corps is said to have cost the poet about £12,000. They rode north; but no sooner had the cavalry come within sight of the Scots army at Dunse, than they turned and fled without aiming a blow. This disgrace gave occasion to numerous lampoons, and to a clever though coarse ballad against Suckling's gay horsemen, who in reality had behaved no worse than the rest of the English army. Their loyal commander, being discovered in a scheme to rescue Strafford from the Tower and to bring in French aid against the parliament, was charged with high treason, and fled to the continent. Of the varying accounts of his death while yet young, the most painful—that he poisoned himself in Paris—is confirmed by family tradition. See the Memoir by the Rev. Alfred Suckling (1836), prefixed to *Selections from the Works of Sir John Suckling.* He had probably run through his fortune, and dreaded want, as well as despaired of the success of the royal arms.—The works of Suckling comprise four plays, now forgotten; a prose treatise, *An Account of Religion by Reason;* a collection of *Letters,* stiff and artificial, and miscellaneous poems, beginning with *A Session of the Poets* (1637), original in style, and happily descriptive of the author's contemporaries. But the fame of Suckling rests on his songs and ballads, which are inimitable for ease, gayety, wit, fancy, and exquisite felicity of poetic diction.

SUCRE, *sô'krā* [named from Antonio José de *Sucre* (q.v.)]: monetary unit of Ecuador: the gold Sucre has the value of 77.1 cents in U. S. gold coin.

SU'CRE. See CHUQUISACA.

SU'CRE, ANTONIO JOSÉ DE: soldier: 1793, Feb. 3—1830, June 4; b. Cumana, Venezuela. On graduating 1810, at the Coll. of Milit. Engineers, Caracas, he joined the patriot army, and served as staff-officer with Gen. Miranda, Gen. Mariño, and Gen. Bolivar, who called Sucre 'the soul of the army' because of his genius for organization. Sent into Peru in command of a liberating force, he won the victory of Pichincha, which freed Ecuador from the Spanish domination, 1822, May 24. In the decisive engagement on the plain of Ayacucho, 1824, Dec. 9, Sucre at the head of a force of 5,800 men utterly

routed the Spanish army of 9,300 men commanded by the viceroy of Peru, La Serna; thus ended the power of Spain in Peru. Upper Peru having been declared an independent republic under the name of Bolivia, Sucre was elected its president for life, 1826, May 25, but accepted only a term of two years, and resigned the office 1828. He then retired to Guayaquil, and was made commander-in-chief of the Colombian army of defense against an invasion from Peru: he inflicted a severe defeat on the invaders 1829, Feb. 26. He was assassinated while returning to Guayaquil from the Colombian congress at Bogota.

SUCROSE, n. *sū'krōs* [F. *sucre,* sugar (see SUGAR)] cane-sugar, as distinguished from *grape-sugar* or *glucose.* See SUGAR.

SUCTION, n. *sŭk'shŭn* [OF. *suction,* suction—from L. *suctus,* sucked; *sugĕrĕ,* to suck]: act of drawing into the mouth or into a pipe, which is effected by removing the pressure of the air. SUCTION VALVE, the lowermost valve in a lift pump. It is actuated by the pressure of the atmosphere beneath the valve acting against the vacuum above. SUCTORIAL, a. *sŭk'tō'rĭ-ăl,* fitted for sucking. SUCTO'RIAN n. *-rĭ-ăn,* one of a class of fishes having a mouth adapted for suction.

SUCTORIA, *sŭk-tō'rĭ-a:* name that has designated one or another order or division of several sub-kingdoms of animals, all characterized by mouth adapted to sucking: such as marsipobranchs among fishes, fleas among insects, leeches and flat-worms among worms, certain degraded parasitic forms (e.g., *Lernœa*) among crustaceans, and tentacled infusorians among protozoa.

SUDAMINA, n. plu. *sū-dā'mĭ-nă* [*sūdo,* I perspire], or MILIARY ERUPTION: one of the vesicular diseases of the skin. The first name indicates that the disorder is always accompanied with profuse sweating; the last name refers to the small size of the vesicles, which do not exceed those of a millet-seed. The vesicles are most abundant on the neck and trunk, and are sometimes attended with itching. They almost always occur in association with febrile disorders, which, however, do not seem in any way modified by them. The only known condition that favors their production is copious and prolonged sweating. They sometimes appear in health during the summer heat, when strong exercise has induced copious sweating. Pathologically, this disease is of little importance; but is sometimes useful as a sign in diagnosis, especially in typhus and typhoid fevers.

SUDAN, or SOUDAN, *sô-dân':* Arabic equivalent of Negro-land or Nigritia; a term applied to African areas of indefinite extent. In its widest sense, it denotes the enormous zone of more or less fertile land stretching from the Atlantic to the Red Sea and the Abyssinian highlands, and from the Sahara and Egypt proper in the

n. to the Gulf of Guinea, the central equatorial regions, and the Albert and Victoria Nyanzas. This is actually the home of the true negro race, though there are various elements in the population. The Soudan in this sense falls naturally into three great divisions: (1) *Western Soudan,* comprising the basins of the Senegal, the Niger, the Benuwe, and other rivers draining to the Atlantic (see SENEGAMBIA: NIGER: ETC.); (2) *Central Sudan,* including the basins of the Shari and other rivers running into Lake Tchad, and covering the countries of Bornu (q.v.), Begharmi (q.v.), Kanem, Wadai; (3) *Eastern Sudan,* the rest of the Sudan area e. of Wadai, mainly the basin of the Middle and Upper Nile—a portion of the Sudan, which, having been gradually conquered by Egypt, is frequently styled also the *Egyptian Sudan.*

Until 1882 the Egyptian Sudan formed one ill-organized province, with its cap. at Khartoum, at the junction of the White and Blue Nile. Subsequently it was subdivided into four sections: (1) *West,* including Darfur (q.v.), Kordofan (q.v.), Bahr-el-Ghazal (the province on a w. tributary of the White Nile, s. of Kordofan), and Dongola (q.v.), the cap. being Fasher in Darfur; (2) *Central Sudan,* comprising Khartoum (q.v.), Sennaar (q.v), Barber, Fashoda (s.e. of Kordofan), and the equatorial province stretching along the Upper Nile to the great lakes—cap. Khartoum; (3) *East Sudan,* along the Red Sea, including Taka, Suakin, and Massowah (q.v.); (4) *Harar* (q.v.), e. of Abyssinia and n. of the Somali country, nearly separated from the rest of the Egyptian possessions, and divided into Zeyla, Berbera, and Harar. The formerly Egyptian Sudan must have had an area of 2,500,000 sq. m., and pop. 12,000,000. Of the inhabitants, probably three fourths are of pure or mixed negro descent, the rest of various Semitic and Hamitic elements. The former are mostly pagans or nominal Mohammedans; the latter are fanatical Mohammedans. The so-called 'Arabs' of this region, though some have a small share of Arab blood, are of very various tribes. For the ethnology of one large and important section of this domain, see NUBIA.—See also, NILE.

Political events have of late concentrated attention on the Egyptian Sudan; especially the insurrection of the w. portion under the fanatical Mohammedan mahdi, the resolution of the Egyptian govt. (under English influence) to abandon the whole Sudan except the strip along the Red Sea coast, and the mission of Col. Gordon to Khartoum. See EGYPT; GORDON, CHARLES GEORGE. For eleven years after the capture of Khartoum by the mahdi and the death of Gen. Gordon (1885) the Egyptian Sudan was abandoned. In 1896, however, the increasing power of the dervishes, and the defeat of the Italians in Abyssinia (1896, March), led the British govt. to determine on a demonstration in force from

Wadi Halfa into the Sudan. By agreements with Germany and Italy the sphere of British influence extends over Darfur and the greater part of the equatorial province, but France has not acknowledged this and in 1895 organized expeditions in the French Congo and Sudan, whose object was to advance into the Nile valley. This action called forth a declaration by the British govt. that such expeditions would be considered as unfriendly acts, and here the matter rested; but on application being made to the governor of the 'caisse de la dette' for £500,000 from the reserve fund toward the expenses for carrying on the expedition (1896, March) the representatives of France and Russia objected. They, however, were overruled by the representatives of the other powers. In June several attempts, attributed to France and Russia, to prohibit the advancing of funds for the expedition were disclosed when a mixed tribunal published its decision declaring the advance illegal and condemned the British govt. to repay the various sums advanced. In spite of this opposition the Anglo-Egyptian expedition set out under the sirdar, Sir Herbert Kitchener (1896, March). Without opposition it occupied Akasheh, and this movement let Osman Digna, chief of the dervishes, to retire from Kassala (Apr. 10), where he was threatening the Italians. In May the sirdar advanced on Ferkeh, there defeated the dervishes, capturing several emirs, then pushed on to Suarda. A cholera epidemic delayed the troops during June and July, but on Aug. 26 the expedition, now accompanied by several gunboats, moved toward Absarat. Here heavy storms, which destroyed a newly built railroad, impeded the general advance, but Dulgo was reached Sept. 13th, Fereig 14th, Barji 17th, and Kerman 19th. At Kerman the dervishes were posted in force, but retired across the river to Hafir as the expedition advanced. Hafir was shelled by the gunboats and artillery; the enemy were driven out and their only steamer captured. Pressing forward with cavalry and gunboats, the expedition occupied Dongola on the 23d after slight resistance. Soon after Korti and El Debbeh, Meraur and Handak, on the road to the south, were fortified to make the occupation of the province of Dongola secure. In 1898 the victory of the Anglo-Egyptian army was complete. Since 1899, Jan. 19, the Sudan has been ruled by a governor general appointed by Egypt with the assent of Great Britain.

SUDATORY, n. *sū'dă-tōr-ĭ* [L. *sudatōrĭum*, a sweating-bath—from *sudārĕ*, to sweat]: a sweating room or bath: ODJ. sweating. SUDATOR'IUM, n. *-tor'ĭ-ŭm*, a hot-air bath for promoting perspiration.

SUDBURY: a town in Nipissing district, Ontario, Canada, situated to the n. of Georgian bay, on the Canadian Pacific railway, 443 m. w. of Montreal, 125 m. w. of Mattawa, and 182 m. e. of Sault Ste. Marie. The

branch to Sault Ste. Marie leaves the main line here. Two short railway lines connect the town with its celebrated mines of nickel and copper. The ores are partly reduced in furnaces near the town. Pop. (1901) 2,027.

SUDDEN, a. *sŭd'dn* [F. *soudain,* sudden—from L. *subĭtānĕus*—from *subĭtus,* sudden]: happening without notice or warning; unlooked-for; rash; hasty: AD. in *OE.,* in haste; suddenly. SUD'DENLY, ad. *-lĭ,* unexpectedly; without premeditation. SUD'DENNESS, n. *-nĕs,* the state of being sudden; unexpected presence. ON or OF A SUDDEN, sooner than expected; unexpectedly.—SYN. of 'sudden': unexpected; unusual; abrupt; unlooked-for; unanticipated.

SUDDEN DEATH: occurring from either natural or violent causes. It may occur naturally from syncope (fainting or swooning), from asphyxia (literally pulselessness), more correctly apnœa (privation of breath), or from coma (insensibility). See DEATH.—Syncope, or sudden cessation of the heart's action, may occur in two ways: (1) By the heart losing its irritability (or becoming paralyzed), so that it ceases to contract; (2) By the heart being affected with tonic spasm, in which it remains rigidly contracted, losing its usual alternation of relaxation. Sudden death from asphyxia, more correctly apnœa, occurs when from any cause the entrance of air into the lungs is prevented: it is not so often a result of disease as of accident. It is caused sometimes by a spasmodic closure of the chink of the glottis (see LARYNX). Sudden death from coma is liable to occur in apoplexy and injuries of the head. (See also STATUS LYMPHATICUS).

Suddenness of death is not in itself indicative of poison. Natural death may occur suddenly as well as slowly; conversely, death may supervene slowly, and yet be the result of poison. Apoplexy or disease of the heart may prove fatal either instantly or within an hour: very few poisons operate with such fatal rapidity.

SUDERMANN, HERMANN: German author: b. Matzicken, Prussia, 1857, Dec. 9. He was a private instructor and a journalist, published *Im Zwielicht* (1887), a collection of *Novellen,* in the same year the somewhat autobiographical *Frau Sorge,* and in 1888 and 1889 respectively *Geschwister,* a volume comprising two short stories, and *Der Katzensteg,* based on the Napoleonic invasion of Prussia. The last remains what is probably Sudermann's best work in prose fiction, though the over-melodramatic *Es war* (1894) is more ambitious. In Nov., 1889, his drama, *Die Ehre,* was presented. In that year Hauptmann's *Vor Sonnenaufgang* also appeared. Sudermann's work is more effective, better constructed dramaturgically than Hauptmann's, but is considerably inferior in poetic quality and preservative elements. *Die Ehre* was followed by *Sodoms Ende* (1890); *Heimat* (1893), presented in the United States in English as *Magda;*

Die Schmetterlingsschlacht (1894); *Das Glück im Winkel* (1895); *Morituri* (1896), a collection of three one-act plays; *Johannes* (1898), a prose drama dealing with John the Baptist; *Die Drei Reiherfedern* (1898), an unsuccessful *Märchendrama; Johannisfeuer* (1900), and *Es Lebe das Leben* (1902), given in an English version in the United States as *The Joy of Living.* Sudermann at least joined to some extent with Hauptmann in giving literary interest to modern German drama. Consult the study by Kawerau (1897); Francke, *Social Forces in German Literature* (1896).

SUDETENGEBIRGE, *sô'dėh-tėn-gėh-bĭrch'ėh:* the most important mountain-range of Germany; dividing Prussian Silesia and Lausitz from Bohemia and Moravia, and connecting the Carpathians with the mountains of Franconia. It is not continuous except in the middle, where it is known under the names Riesengebirge and Isergebirge. The Sudentengebirge are rich in minerals, especially in the metals, iron, lead, copper, zinc, tin, cobalt, with some silver and gold. Schneekoppe (Snow-Peak) in the Riesengebirge, about 5,000 ft. high, is the culminating point.

SUDORIFIC, a. *sū'dŏr-ĭf-ĭk* [L. *sūdor,* sweat; *facĭō,* I make: F. *sudorifique*]: causing sweat: N. a medicine which causes sweat. SU'DORIF'EROUS, a. *-ĭf'ėr-ŭs* [L. *fero,* I bear]: producing or secreting sweat. SUDORIPAROUS, a. *sū'dŏr-ĭp'ă-rŭs* [L. *parĭō,* I produce]: producing sweat or perspiration.

SUDRA, n., also spelled SOODRAH or SOODRA, *sô'dra* [Skr. *çudra:* Hind. *sudr*]: the artisan caste, or lowest of the four great castes among the Hindus; the others are: *Brahmin,* the highest or priestly caste; *Shatriya,* the second or military caste; *Vaisya,* the third or merchant caste. See CASTE.

SUDS, n. plu. *sŭdz* [Ger. *sod,* the bubbling up of boiling liquor: Dut. *zudderen,* to boil with a suppressed sound: Icel. *sod,* water in which meat has been sodden]: soapy water. TO BE IN THE SUDS, to be in difficulty or turmoil.

SUE, v. *sū* [OE., *seuve;* OF, *sewir;* Sp. *sequir,* to follow, to pursue at law—from L. *sequi,* to follow]: to seek justice or right by legal process; to seek for in law; to petition; to entreat; to apply for; to seek in marriage; in *OE.,* to gain by legal procedure. SU'ING, imp. SUED, pp. *sūd.* SUABLE, a. *sū'ă-bl,* that may be sued. SU'ABIL'ITY, n. *-bĭl'ĭ-tĭ,* liability to be sued. TO SUE OUT, to petition for and take out.

SUE, *sü,* JOSEPH MARIE EUGENE (Generally known as EUGENE SUE): French novelist of the melodramatic style: 1804, Dec. 10—1859, Aug. 3; b. Paris. His father was one of the household physicians of Napoleon, and educated his son for his own profession. As surgeon in the army and navy, Sue served in Spain 1823 and at Na-

varino 1828. In 1829 his father died, leaving him a fortune. He betook himself to fiction-writing, and very soon gained popularity. His earlier efforts—sea-stories somewhat after the manner of Cooper, or romances in imitation of Scott—were notably extravagant. Becoming affected with socialist ideas, he produced his two most famous works, the famous *Les Mystères de Paris,* which began to appear 1842 in the *Journal des Débats;* and *Le Juif Errant,* which appeared 1844-5 in the *Constitutionnel.* These had immense popularity in France and elsewhere in Europe, and in the United States. In 1847-8 appeared *Les Sept Péchées Capitaux:* and 1852 *Les Mystères äu Peuple,* his last important work: these cannot be termed edifying. At the revolution of 1848 he allied himself with the extreme republicans. 1850, Apr. 28, he was elected deputy to the legislative assembly for the department of the Seine, and was assiduous in his duties as such till the *coup d'état* of 1852, Dec., by which he was driven into exile. He retired to Savoy; and at Annecy he died.

In the writings of Sue much power is displayed, but not of the most healthful kind: it depends for effect too much on vicious sources of interest. He has strong command of the element of the terrible, and an undeniable energy due to his political 'purpose.' His artistic and moral faults are often obtrusive; though the latter seem almost excusable in comparison with much of French fiction that has since become popular. His literary style is of low grade. His books, even though read once with a fever-heat of curiosity, do not bear reperusal.

SUET, n. *sū'ĕt* [OF. *seu;* F. *suif;* It. *sevo,* tallow, fat —from L. *sēbum,* suet, grease]: solid fatty tissue, which accumulates about the kidneys and the omentum of several domestic animals, especially the ox and sheep. Beef suet is extensively used in cookery. Purified mutton suet, *Sevum Præparatum* of the Pharmacopœia, is obtained by melting and straining the internal abdominal fat: it consists of a mixture of the ordinary animal fats, with great preponderance of the most solid of them, stearin, which constitutes about three-fourths of the whole. The pure suet of the Pharmacopœia is 'white, soft, smooth, almost scentless; and is fusible at 103°': it is an ingredient in cerates, plasters and ointments. Ordinary melted suet is frequently used like lard, to preserve potted meats or fish and similar articles from action of the air. SU'ETY, a. *-ĕt-ĭ,* consisting of suet, or resembling it.

SUETONIUS, *swē-tō'nĭ-ŭs* (CAIUS S. TRANQUILLUS): Roman historical compiler and miscellaneous writer: b. probably not long after A.D. 70; date of death unknown; son of Suetonius Lenis, tribune of the 13th legion under Otho. Suetonius and his writings are highly praised by the Younger Pliny, who was his friend and correspondent. He was also, it is supposed, a teacher of grammar and

rhetoric, and composer of exercises in pleading; and, from a letter of Pliny to him, he seems to have sometimes pleaded causes in person. Pliny procured him the dignity of military tribune, which, by Suetonius' desire, was transferred to another. Though childless, Suetonius was (contrary to the usual Roman law), through the same friendly agency, presented by Trajan with the *jus trium liberorum*. He was afterward secretary of Emperor Adrian. All his works (among which, as we learn from Suidas, were several on topics treated usually by grammarians) have been lost, except his *Lives of the Cæsars;* his *Lives of Eminent Grammarians*, and (in part) his *Lives of Eminent Rhetoricians*. By the first of these Suetonius is most known, replete as it is with information—rather with anecdote and with gossip sometimes scandalous—about the Twelve Cæsars, from C. Julius to Domitian, such as are not found elsewhere. From a period long before the renaissance to the present, these 'Lives' have found numerous editors, the best of whom is still Burmann (Amsterdam 1736), and numerous translators into European languages.

SUEVI, *swē'vī:* people mentioned first by Cæsar, in whose history (*De Bello Gallico*) the name is the collective designation of a great number of Germanic peoples, occupying an indefinite district on the e. side of the Rhine. They may have been the tribes subsequently known as Chatti, Longobardi, etc. Cæsar states that their territory comprised 100 cantons, and was densely wooded; that they had towns (*oppida*), but no strongholds, and that every year a part of the population left their homes to seek employment in war.—Different were the Suevi of whom Tacitus speaks (*Germania*, 38, etc.), who seem to have dwelt n. and e. of the Suevi of Cæsar, extending as far as the Elbe and the Baltic, which Tacitus calls the 'Suevic Sea.' The peoples united under the rule of Maroboduus, the Marcomannic chief, were Suevic; hence the Marcomanni and Quadi, who figure in the reigns of Marcus Aurelius and Aurelian, are often called Suevi. After the name had fallen into disuse as a collective designation, it reappeared (second half of the 3d century, *Amm, Marc.*, etc.) as the name of a people occupying the same territory as the Suevi of Cæsar, who appear, however, to have been a mixed race of adventurers from different parts of Germany, and who probably took the name of Suevi after possessing themselves of the country. We find them in alliance with the Burgundians, Alemanni, Alani, Vandals, etc. They are among the most notable of the barbaric peoples that broke up the Roman Empire in the n.w. and w. Bursting through the passes of the Pyrenees, A.D. 409, they, with the Vandals, overran and wasted Spain. Those who remained at home in Germany seem to have spread during the 5th century e. to the Neckar and the Rauhe Alps, and s. as far as Switzerland.

SUEZ, *sô-ĕz'* (*Suweis*): town of Egypt and port on the Red Sea, s. terminus of the S. Canal (q.v.), at the head of the Gulf of S. (see SUEZ, GULF OF); lat. 29° 58′ 37″ n., long. 32° 31′ 18″ e.; 76 m. e. of Cairo, with which it is connected by railway. It is walled on all sides but that toward the sea. Until the construction of the canal 1869 it was a small, ill-built, wretched looking town, with pop. about 5,000. Its old harbor was poor. The new harbor is about 2 m. s. of the town. S., though much improved in recent years, has still a mean appearance, and shows no great growth. From the 16th to the 18th c., S. had some commercial importance. It is notable now only as a station on what is called the Overland Route (q.v.) from Europe to India and the East (see RED SEA: SUEZ CANAL). Rain falls seldom, sometimes not once in three years. All around stretches a burning waste of sands. Pop. (1900) 15,000.

SUEZ′, GULF OF: western and larger of the two branches into which the Red Sea divides toward its n. extremity. The gulf washes on the w. the coast of Egypt, on the e. that of the Sinaitic peninsula; extreme length 200 m., average breadth about 20 m. The shores are in many places low, barren, and sandy wastes; in others, bold and rocky headlands.—See RED SEA.

SUEZ′, ISTHMUS OF: neck of land 72 m. wide at its narrowest part, extending from the Gulf of Suez on the s. to the Mediterranean on the n., and connecting the continents of Asia and Africa. It embraces within its limits (according to the received opinion) the fertile Goshen (q.v.) of antiquity; but it is now a wretched uninhabitable waste, of mingled sand and sandstone, interrupted here and there with salt swamps or lakes, but almost destitute of fresh water. The main interest of this region, in recent times, has been due to the fact that the isthmus is on the great route to India and China: see SUEZ CANAL.

SUEZ′ CANAL: ship-canal crossing the Isthmus of Suez between the Mediterranean and the Red Sea, and separating Africa from Asia. In ancient times a canal existed connecting (indirectly) the two seas. Herodotus ascribes its projection and partial execution to Pharaoh Necho (about B.C. 600). Aristotle, Strabo, and Pliny less felicitously fix on the half-mythical Sesostris as its originator. Its completion is assigned by some to Darius, King of Persia; by others to the Ptolemies. It began about a mile and a half from Suez, and passed n.w. through a remarkable series of natural depressions to Bubastis, on the Pelusiac or e. branch of the Nile. Its length was 92 m. (of which more than 60 were cut by human labor); its width 108 to 165 ft., its depth 15 (Pliny says 30) ft. At a date unknown it became choked with sand, was restored by Trajan early in the 2d c. after Christ, but again became choked with sand, and so remained till the conquest of Egypt by Amrou, Arab gen. of the caliph Omar, who caused it to be reopened, and named it the 'Canal of the Prince of the Faithful.' After more than a century of use

it was finally blocked up by the unconquerable sands, 767. Bonaparte during his invasion of Egypt, about 1798, caused the isthmus to be surveyed by engineers, who erroneously reported the level of the Mediterranean 30 ft. below that of the Red Sea at Suez. In 1847 France, England, and Austria sent a commission to measure accurately the levels of the two seas, and it was ascertained that the two seas have practically the same mean level, though with a tide of 6½ ft. at the southern end and 1½ ft. at the northern. A railway from Cairo to S., connecting the Red Sea with the Nile, was opened 1858 (see OVERLAND ROUTE). The French engineers clung to the project of a canal, and 1856, De Lesseps, then in the French diplomatic service in Egypt, obtained from the pasha the exclusive privilege of forming a ship-canal—not from the Nile, but directly across the isthmus to Suez (see LESSEPS, FERDINAND DE). In 1855 a new European commission reported that the scheme, somewhat modified, was practicable: the result was the formation of a joint-stock company, in which Saïd, Khedive of Egypt, took a large number of shares, and made large concessions of land; and the work was begun 1860.

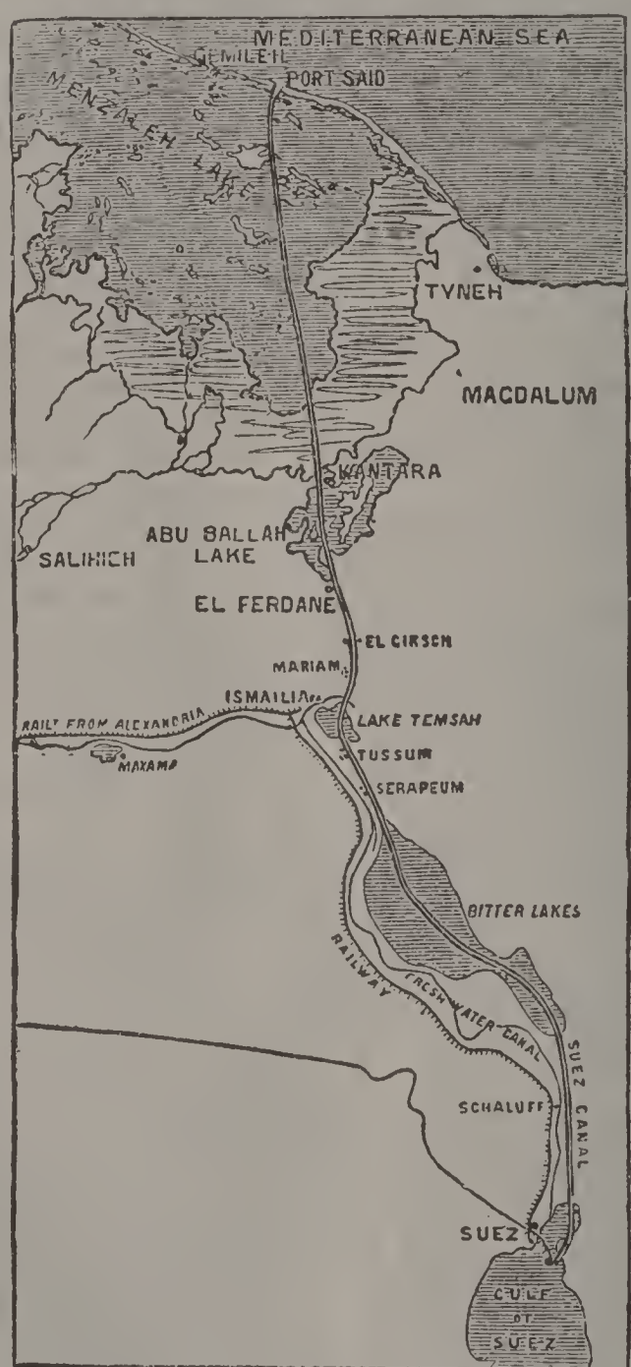
The British nation had at first little favor for De Lesseps's scheme, partly through some distrust of its engineering and financial features, but probably more from fears that the canal might divert from Great Britain the trade of the East. These fears the event has proved groundless; usually about four-fifths of all the shipping that passes through the S. C. is English. The canal was formally opened 1869, Nov. 16, with a grand procession of steamers of various countries, in the presence of the crowned heads of several nations.

Originally a French enterprise, the S. C. has passed more and more under English control. In 1875, the Brit. govt. purchased for £4,000,000 the khedive of Egypt's shares in the canal, which amounted to 176,602 out of 400,000: these shares give no returns to their owner till 1894, the khedive having alienated the dividends till that period in favor of the company. Plans for widening the canal to accommodate the greatly increasing traffic were agreed on 1886, and the works are in progress (1891).

The saving of time from Europe to India for steamers is great; but because of hinderance at the Red Sea entrance by baffling winds, sailing vessels generally still follow the ancient route. From London or Hamburg to Bombay is by the Cape about 11,220 m., but by Suez only 6,332—i.e., the voyage is shortened by 24 days. From Marseilles or Genoa there is a saving of 30 days; from Triest, of 37. The rate at which steamers are allowed to pass through, is 5 to 6 knots an hour. The canal charges are 10 francs per ton (net tonnage), and 10 francs per head for passengers. Pilotage dues were abolished 1884. The S. C. admits steamers 400 ft. long and 50 ft. beam: usual time for passage (including delays) two or three days.

Construction, Dimensions, etc.—The total length of the navigation is about 101½ m., of which about 76$\frac{1}{10}$ m are

actual canal formed by cuttings, $16\frac{1}{7}$ m. are made by dredging through lakes; and $9\frac{1}{5}$ m. through lakes or hollows required no works. The deep channel through the lakes is marked on either side by iron beacons 250 ft. apart: this portion requires the most care in navigation to keep the vessel in the centre. The canal is intended to



Map showing Suez Canal.

have a navigable depth of 26 ft., for a width of 72 ft. on the bottom, with width at top varying from about 200 ft. to 325 ft. or more according to the character of the material through which it is cut. At one time about 30,000 laborers were employed, for many of whom dwellings had to be provided: fresh water for them was conducted through a canal from the Nile. The total cost of the S. C. and its harbors is stated at $100,000,000.

SUEZ CANAL.

The Port Said Entrance.—Port Said or Saïd, town on the Mediterranean (pop. [1880] 12,332; [1882] 16,560), had no existence in 1860. It became the depot of the Canal Company, metropolis of the host of laborers and others employed on the works. As the Mediterranean Sea is very shallow near this point, an artificial deep channel had to be made, bounded e. and w. by piers stretching far into the sea. These piers are of artificial stone made on the spot, consisting of two parts of sand and one part of hydraulic lime ground into paste, and poured into wooden boxes or molds, and, after solidifying, hardened by exposure for months in the dry air. Each block weighed 20 tons. The w. pier has a length of about 7,000 ft., and the e. of about 6,000 ft.; they are 4,600 ft. apart at the shore, but gradually approach each other, so that their outer ends are only 2,300 ft. apart. The w. pier is continued in an arc of 3,300 ft. extent, so as, with the e. pier, to shelter the harbor from all winds. The area inclosed is about 450 acres, with average depth about 14 ft., except in the channel leading to the canal, where the depth is 25 to 28 ft. Within this outer harbor is an inner port, 2,610 ft. by 1,500, kept at a depth of 30 ft., by steam-dredging. The lighthouse is 180 ft. high.

From Port Said to Temsah Lake.—From Port Said, the canal crosses about 20 m. of Menzaleh Lake, a salt-water shallow closely resembling the lagoons of Venice, having 1 to 10 ft. depth of water: the canal through this lagoon is 336 ft. wide at the surface, 78 ft. at the bottom, 26 ft. deep. An artificial bank rises 15 ft. on each side of this channel. Beyond Menzaleh Lake, heavier works begin. The distance thence to Abu Ballah Lake is 11 m., with a height of ground above sea-level from 15 to 30 ft. After crossing this lake, there is another land distance of 11 m. to Temsah Lake, cutting through ground to a depth varying from 30 to 70 or 80 ft.; then 3 m. further across this little lake itself. At El Guisr, or Girsch, is the deepest cutting in the whole line, 85 ft. below the surface; at the water level it is 336 ft. wide, at the summit-level 519 ft., from which the vastness of the gap may be estimated. Ismailia (pop. 5 000) on Temsah Lake, is regarded as the central point of the canal.

The Fresh-water Canal.—This extends from the Nile to Temsah Lake, and was constructed to supply with water the population accumulating at various points on the line of the canal; but it is also used by small sailing-vessels. This fresh-water or 'sweet-water' canal comprises three portions or sections: (1) from the Nile e. or n.e. to Ismailia, on Temsah Lake; (2) from Ismailia nearly s. to Suez, on the w. side of the great ship or maritime canal; (3) from Ismailia nearly n. to Port Said, also on the w. side of the ship-canal. The first and second of these sections are really canals, large enough to accommodate small steamer and barge traffic; the third section consists simply of a large iron pipe, through which the water is conveyed to the several stations. Plugs are inserted in the pipe where needed, to allow water to be drawn off for every-day wants.

From Temsah Lake to Suez.—The route crosses Temsah Lake to Toussoum and the Serapeum cutting, through a plateau 46 ft. above the sea, where the waters were let in by the Prince and Princess of Wales, 1869, Feb. 28. There is a space from Temsah Lake to the Bitter Lakes, about 8 m., which had to be dug to a depth varying from 30 to 62 ft. according to the undulations of the surface. In these deep cuttings, the quantity of sand dug out (for nearly all is sand, though sometimes agglomerated with clay) was enormous. In passing through the Bitter Lakes, there was more embanking than excavating, as the bottom of this region is only 6 to 10 ft. above the intended bottom of the great canal. The tide from the Red Sea comes in as far as to the Bitter Lakes. From the s. end of the Bitter Lakes to Suez, about 13 m., is another series of heavy cuttings through the stony plateau of Chalouf, 30 to 56 ft. in depth.

The shipping passing through the canal has steadily increased since its opening. In 1870, 486 vessels, of a total burden of 654,915 tons, sailed through it, yielding the company an income of $1,032,000; in 1874, 1,264 vessels of 1,649,188 tons passed through and the receipts amounted to over $5,000,000. In 1900, 3,441 vessels, of 13,699,238 tons gross measurement, passed through, the receipts being about $18,000,000. The passengers passing through numbered 282,203. Fully one-half of the tonnage passing through is British. After Britain, in decreasing order, come the vessels of Germany, France, Holland, Austria, Russia, Japan, and Italy. The tolls charged are 9 francs per ton for laden passenger or cargo steamers and warships; 6½ francs per ton for ships in ballast without passengers; and 10 francs for each passenger. These heavy tolls and the resulting enormous profits, together with the fact that Britain was miserably represented on the board of management, in course of time created much dissatisfaction among British shipowners, and in 1883 there was much talk about the construction of a second canal. This came to nothing, but led to the widening and deepening of the existing canal, and the construction of large basins to allow north and south-going vessels to pass each other. Since Jan. 1, 1902, the maximum draft for vessels has been fixed at 8 metres (26¼ ft). The depth is to be increased to 9½ metres, and additional stations for large vessels are to be provided. The distance between London and Bombay by the old route round the Cape is about 11,220 m.; by the new route opened up by the canal 6,332 m. Steamships are allowed to sail at a speed of 5 to 6 knots an hour along the canal. The most complete test the canal has had was the successful passage through of the fleet of the United States war-vessels on its return from the world-circling cruise in the winter of 1908-1909. See Canals.

SUF, *sŭf:* another form of Sub, which see.

SUFFER, v. *sŭf'fėr* [L. *sufferrĕ*, to carry under, to sustain—from *sub*, under; *fero*, I carry: F. *souffrir*, to suffer]: to endure, support, or sustain; to feel or bear with a sense of pain or distress either in body or mind; to permit; to tolerate; to bear patiently; to feel or undergo pain; to undergo punishment; to sustain hurt or loss; to pass through; to be affected by; to be injured. SUF'FERING, imp.: ADJ. undergoing pain or loss; permitting: N. the bearing of pain or loss; pain endured; injury incurred. SUF'FERED, pp. *-fėrd*. SUF'FERER, n. *-ėr*, one who endures pain or loss; one who permits. SUF'FERABLE, a. *-ă-bl*, that may be endured; supportable. SUF'FERABLY, ad. *-blĭ*. SUF'FERANCE, n. *-ăns*, endurance; the bearing of pain; allowance; toleration, as in the phrase 'on *sufferance*'; permission granted by the custom-house for the shipment of certain goods; in *OE.*, patience; moderation. SUF'FERINGLY, ad. *lĭ*.—SYN. of 'suffer': to bear; undergo; allow; permit; endure; admit;—of 'sufferance': pain; inconvenience; misery; permission; patience; moderation.

SUFFICE, v. *sŭf-fīs'* [L. *sufficĕrĕ*, to put in the place of, to be sufficient—from *sub*, under; *facĭō*, I make: F. *suffire*, to satisfy]: to be equal to the wants or demands of; to satisfy; to be enough; to be equal to the end in view. SUFFI'CING, imp. SUFFICED', pp. *-fīst'*, adequately supplied. SUFFI'CIENT, a. *-fĭsh'ĕnt*, enough; equal to the end proposed; ample; adequate; qualified; fit. SUFFI'CIENTLY, ad. *-lĭ*. SUFFI'CIENCY, n. *-ĕn-sĭ*, state of being sufficient; necessary qualification; adequate substance or means; ability; supply equal to wants; self-confidence.—SYN. of 'sufficient': adequate; competent; full; satisfactory; proportionate; commensurate.

SUFFIX, n. *sŭf'fĭks* [L. *suffixus*, fastened or fixed on—from *sub*, under; *fixus*, fixed or fastened; *figo*, I fix]: a particle added to the end of a word to modify its meaning; an affix; a postfix. SUFFIX, v. *sŭf-fĭks'*, to add to the end of a word. SUFFIX'ING, imp. SUFFIXED', pp. *-fĭkst'*.

SUFFOCATE, v. *sŭf-fō-kāt* [L. *suffocātus*, pp. of *suffocārĕ*, to suffocate—from *sub*, under; *fauces*, the throat: F. *suffoquer*, to stifle]: to kill by stopping respiration; to stop breathing; to stifle; to smother. SUF'FOCATING, imp.: ADJ. choking; stifling. SUF'FOCATED, pp. SUF'FOCA'TINGLY, ad. *-lĭ*. SUF'FOCA'TION, n. *-kā'shŭn* [F.—L.]: suspension or loss of power of respiration; act of choking or stifling; state of being choked (see ASPHYXIA; RESPIRATION). SUF'FOCATIVE, a. *-tĭv*, tending to choke or stifle.

SUFFOLK, *sŭf'ok*: maritime and most easterly county of England; bounded n. by Norfolk, s. by Essex; greatest length n. to s. about 50 m., greatest breadth e. to w. about 55 m.; 1,475 sq.m., or 944,060 acres. The surface is flat, falling away into marshes on the n.w. and s.e. borders. The coast line, low and marshy, or lined with cliffs of shingle or gravel and red loam, is about 50 m.

in length; and is unbroken by any considerable indentation, and comprises no large headland except Lowestoft Ness, most easterly point in Great Britain. The chief streams are the tributaries of the Waveney, which separates Suffolk from Norfolk on the n., and those of the Stour, which forms the s. boundary-line, together with the river Lark, affluent of the Great Ouse, and the Gipping, which, after it begins to broaden into an estuary, is called the Orwell. The climate is cold in spring, but drier than that of the w. counties. Suffolk is one of the most fertile counties in England. The soil is of various kinds, some of which are very productive: 770,000 acres are under cultivation, and the most improved system of agriculture has been introduced, with the best and newest agricultural implements. A polled breed of cattle, of which the cows are held in high esteem, is peculiar to the county. The Suffolk pigs, usually black in color, are a famous and most profitable breed. Branches of the Great Eastern railway intersect the county in all directions. Suffolk has many splendid residences, and some very interesting ruins of castles and abbeys. Pop. (1901) 306,678.

SUFFOLK, Va.: town, county-seat of Nansemond co.; on the Nansemond river, and on the Norfolk and Carolina, the Atlantic and D., the Seaboard Air Line, and the Norfolk and Western railroads; about 20 m. s.w. of Norfolk. It is in an agricultural region. The chief manufacturing establishments are woolen mills, lime kilns, lumber mills, iron works, and grist mills. Large quantities of oysters are shipped during the season. In 1900, according to the government census, there were in Suffolk 67 manufacturing establishments, with $402,079 capital invested, and employing 881 persons. The annual wages to the employees were $197,849; the cost of material used annually $1,060,006, and the value of the product was $1,499,068. It has a state bank with a capital of $25,000. The educational institutions are the public schools. Pop. (1900) 3,827; (1910) 7,008.

SUF'FOLK PUNCH: English variety of horse, stout and round in the barrel, strongly built, with low heavy shoulders, and adapted for drawing heavy weights.

SUF'FRAGAN, n. *sŭf'frā-găn*, an assistant bishop; a bishop considered in relation to his Metropolitan: in some churches on the continent of Europe the term is applied to coadjutor bishops appointed to assist a bishop in his own diocese: ADJ. assisting. SUFFRAGES, n. plu. *sŭf'frā-jĕz* [mid. L. *suffrāgium*, supplement, help, prayers to the saints for their help]: united voices of persons in public prayer; in the *Book of Common Prayer*, the prayers of the morning or evening service, which begin with the mutual salutation, the invitation, and lesser Litany; called also the *Prĕcēs*.

SUFFRAGE, n. *sŭf'frāj* [F. *suffrage*—from L. *suffrāgium*, right of voting: It. *suffragio*]: vote or voice in

the election of a candidate for public office; vote given on some controverted point; united voice of a congregation re-enforcing with their assent the minister's utterance; in *OE.*, aid; support.

SUF'FRAGE, in Politics: right to vote; franchise of a voter in the election of public officials or in other public affairs. The idea that universal political suffrage is a right by natural law is grounded on the fiction that the civil state or body politic arises only out of a social compact express or implied. (That the civil state, however arising, assumes the *form* of a social compact, is not denied.) In opposition to this notion of suffrage by natural right, it is argued that the true purpose for which government exists is the general welfare; and that it is the duty of the state to consider and decide whether the suffrage may be more beneficially exercised by all, by the many, or by the few. Infants, minors, idiots, and insane persons have everywhere been excluded from the suffrage, on the ground that sound judgment is requisite to its exercise; also persons convicted of crimes have been excluded, as a security to society. Women have generally been excluded, for reasons based on their relation to society, to the family, and to the opposite sex. In all these cases, suffrage is withheld not as a punishment, nor as a mark of disgrace, but simply on the ground of public expediency—as when a young man 20 years and 51 weeks of age is not allowed the suffrage, while his neighbor one week older has it. Like considerations of expediency, it is argued, are a ground for withholding the suffrage from those whose ignorance or circumstances in life render it unlikely that they should form sound judgment on political questions. It is the intelligence and enlightenment of the country that an elective legislature should represent; and in any large extension of the suffrage there is obviously a risk of the intelligence of a constituency being swamped by its mere numerical majority. On the other hand, a widely extended suffrage is advocated as a valuable means of educating the people to self-dependence; and several philosophical politicians of the present day, favorable to a large extension of the electoral qualification, propose to obviate what they regard as its otherwise inevitable evils, by graduating the suffrage so as to give each individual elector a number of votes corresponding as much as possible to his property, education, or social position: see J. S. Mill, *Considerations on Representative Government* (1861).—In the United States, the principle of universal manhood suffrage (with the exceptions noted near the beginning of this article) seems firmly bedded in the laws and grounded in popular favor. Woman suffrage as an addition is warmly urged by an increasing though not large number.

In the United States, the right of suffrage does not inhere in the fact of citizenship, but is a grant from the

state to a more or less restricted portion of its citizens. All the states exclude from the suffrage minors, idiots, insane persons, and convicted criminals. Women may vote at all elections in Colorado, Idaho, Utah and Wyoming. They can vote at school elections in Kansas. In a more or less limited form, relating to taxation and school matters, woman suffrage also exists in Arizona, California, Delaware, Illinois, Indiana, Kentucky, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Vermont, Washington, and Wisconsin. Results of woman suffrage agitation in the United States have been numerous and important. In the first half of the 19th century, for example, there were only seven occupations open to women. To-day, there are more than three hundred honest ways in which women can and do earn a living. State laws, in many states, have been liberally modified in order to give married women greater control of their own property and other privileges. Petitions, persistently presented in person by leading women in states and territories, have won for the women of such states and territories the privileges they now enjoy. In Canada, the status of women as regards suffrage is about as in the United States; in some localities the right of municipal suffrage and of voting in school elections, etc., is allowed; in others, denied. In the colonies of Australasia qualified woman suffrage prevails widely. In Finland, women have equal suffrage with men in all elections of public officers.

In London women vote in all elections except for representatives. In Russia, women, as householders, vote for all elective offices and on local matters. In Germany, Austria and Italy women have proxy votes on local and even general matters. The results of agitation in England, thus far, for greater legal privileges for women, have been modifications of the property laws, 1882 and 1893. Employment of women, too, in useful occupations, is much more general, and, usually, is found to be satifactory. In France, women teachers vote for boards of education. Since 1898, women in commerce vote for judges of tribunals of commerce. The right to vote comes from the state, and is a state gift. Naturalization is a federal right and is a gift of the Union, not of any one state. In nearly one-half of the Union aliens (who have declared intentions) vote and have the right to vote equally with naturalized or native-born citizens. In the other half only actual citizens may vote. The federal naturalization laws apply to the whole Union alike, and provide that no alien may be naturalized until after five years' residence. Even after five years' residence and due naturalization he is not entitled to vote unless the laws of the state confer the privilege upon him, and he may vote in several states six months after landing, if he has declared his intention, under United States law, to become a citizen.

In the Territories suffrage is regulated by Congress, which may delegate its authority to the territorial legislature. In the District of Columbia, white taxpayers voted from 1802 to 1855, when the suffrage was extended to all white men, and in 1867 to white and black males excepting Confederates and Confederate sympathizers. In 1878 all voters in the District were disfranchised by Congress, local government now being carried on by a board of commissioners.

The inhabitants of Hawaii were declared to be citizens of the United States under the act of 1900 creating Hawaii a territory. Under the United States supreme court decision in the insular cases, in May, 1901, the inhabitants of the Philippines and Porto Rico are entitled to full protection under the constitution, but not to the privileges of United States citizenship until congress so decrees, by admitting the countries as states or organizing them as territories. See REFORM, PARLIAMENTARY; REPRESENTATIONS; BALLOT. Consult: Bishop, *History of Elections;* Thorpe, *Constitutional History of the American People;* Cleveland, *The Growth of Democracy;* Bryce, *American Commonwealth;* Hart, *Actual Government as Applied under American Conditions.*

SUFFREN DE SAINT TROPES, PIERRE ANDRE DE: French naval officer: b. 1726, July 17; d. 1788, Dec. 8. He entered the navy at 14. In 1772 he was commissioned captain. Early in 1777 he sailed to America, and his ship began the indecisive battle of Grenada on July 6, 1779. He next served with the allied fleet blockading Gibraltar, and early in 1781 was placed in command of a squadron of five ships for service in the East Indies. Sailing to Madras, he fought a hard but indecisive battle off Sadras, and soon after, in a bloody two-days' battle off Providien, on the coast of Ceylon, proved himself a consummate master of naval tactics. Having captured *Trincomalee,* he two days later stood out of the harbor with 15 ships against the English 12, and fought a hard but irregular battle. His last fight (June, 1783) was also indecisive. Suffren arrived in Paris early in 1784, and was received with the greatest honors, and created vice-admiral of France.

SUFFRUTICOSE, a. *sŭf-frô'tĭ-kōs,* or SUF'FRUTES'-CENT, a. *-tĕs'sĕnt* [L. *sub,* under; *frutĭcōsus,* shrubby, bushy—from *frutex* or *frutĭcem,* a shrub]: in *bot.,* shrubby underneath; having the character of an undershrub.

SUFFUSE, v. *sŭf-fūz'* [L. *suffūsus,* poured upon—from *sub,* under; *fūsus,* poured; *fundĕrĕ,* to pour]: to overspread with something expansible, as with a fluid, tincture, or color. SUFFU'SING, imp. SUFFUSED', pp. *-fūzd'.* SUFFU'SION, n. *-zhŭn,* the act of overspreading with a fluid or tincture; state of being suffused; that which is suffused or spread over.

SUFISM.

SUFISM, *sŭ'fĭzm*, Persian *tasawwuf*, from *sufi*, a mystic devotee. A word derived from either *suf*, wool, the dress of the mystic; *sufu*, purity; Gr. *sophos* a sage; or *sufa* an ancient tribe of Arabs. Tasawwuf, or sufism, is a mystic system of religious thought wherein the teachings of Eastern mysticism are incorporated into Mohammedanism. The doctrines are pantheistic and almost identical with Buddhism, and Neo-Platonism. The 'safar,' or 'journey' is usually divided into four stages. The first and lowest stage is our common humanity, *nāsut* in which we live according to the *shariah* or moral and ceremonial law. The second is a seraphic condition of soul called *malākut*, for which there is 'the path,' *tarĭkah*. The third is power, *jabrut*, for which there is that higher mystic knowledge called *marifah*. The fourth is absorption into the divinity, *fanah* or *lahut*, for which there is 'The Truth' *hakīkah*. According to some teachers this '*safar*' or journey is extended along eight stages, as follows: bondage, love, seclusion, knowledge, ectasy, truth, union, absorption. For the development of the mystic life there are various forms of ascetic devotion such as are seen among the howling dervishes of Constantinople, and the whirling dervishes of Cairo. These exercises are called *Zikr* (see ZIKR). The teacher, or guide is called a 'Murshid,' or one who is on the straight road. The disciple is called a 'Murīd,' or one who is willing to receive instructions. The very essence of sufism is poetry, and the sufi is never weary of expatiating on *ishk* or divine love. The great sufi leader was Jalal-ud-din, Rumi, the author of a marvellous work entitled *The Masmawi*. He was born at Balkh A.D. 1207, and died at Iconium A.D. 1273. The Persian poets are nearly all Sufis: Sadi (A.D. 1292), Hafiz (A.D. 1389), Jāmi (A.D. 1492), Firdausi (A.D. 1020), Nizāmi (A.D. 1200). In the symbolic language of these poets 'sleep' is divine meditation, 'kiss' the rapture of piety, 'tavern' a place of prayer, 'tresses' the glory of God, 'lips' hidden mysteries, 'black mole' indivisible unity, 'wantonness' religious ardour, 'inebriety' celestial abstraction, 'libertinism' mystic perfection. Consequently there are many lines in the poems of the sufis which advocate morals altogether at variance with the principles of christianity. The sufi mystic belongs to some distinctive order of derwesh, or fakīr, of which there are thirty-two well-known orders, having their distinctive mystic signs and peculiar religious exercises. The origin of these orders is traced to Abu Bakr, the first Caliph, and by the Persians to Ali the son-in-law of the Prophet. For full information the English reader can refer to Hughes' *Dictionary of Islam*; Palmer's *Eastern Mysticism*; Brown's *Derveshes*; Hunt's *Pantheism*; Tholuck's *Sufismus*; Vaughan's *Hours with the Mysties*, Bicknell's *Translation of Hafiz*, and Ouseley's *Persian Poets*.

SUGAR, n. *shûg'ér* [F. *sucre;* Ar. *sakkar;* Skr. *sharkara,* sugar: L. *sacchărum;* Gr. *sakchăron*, sugar: comp. Gael. *sùg*, to suck; *sùgh*, juice, sap]: sweet substance obtained from the expressed juice of the sugar-cane, beet-root, etc. (see below): ADJ. made of or resembling sugar: V. to season, sweeten, or cover with sugar. SUG'ARING, imp.: N. the act of covering or sweetening with sugar; the sugar thus used. SUG'ARED, pp. *-ërd:* ADJ. sweetened. SUG'ARY, a. *-ër-ĭ*, sweetened with sugar; resembling or containing sugar. SUG'ARLESS, a. *-lĕs*, without sugar. SUGAR-BAKER, one who makes loaf-sugar; a sugar-refiner. SUGAR-BOILING, the art or business of a sugar-refiner. SUGAR-CANDY, or ROCK-CANDY, sugar made in the form of large crystals. SUGAR-CANE, a cane or plant from whose juice sugar is obtained (see below). SUGAR-HOUSE, the place where sugar is refined. SUGAR-LOAF, a mass of refined sugar made in the form of a cone (see SUGAR, below). SUGAR-MAPLE, tree, native of N. Amer., from whose sap sugar is manufactured (see MAPLE: also SUGAR, below). SUGAR-MILL, machine for expressing the juice of the sugar-cane (see SUGAR, below). SUGAR-MITE, a small wingless insect found in moist sugar. SUGAR-PLUM, a sweetmeat in the form of a small ball. SUGAR-REFINER, one whose business is to make sugar whiter and purer. SUGAR-REFINING, the process by which raw or very brown sugar as imported is purified (see SUGAR, below). SUGAR OF LEAD, common name for acetate of lead, white like sugar, having a sweet taste, but highly poisonous: see LEAD.

SUG'AR: general name of sundry carbo-hydrates, possessing more or less sweet taste, for the most part crystallizable, and produced by the vital processes in certain plants and animals. Nearly all sugars are capable of fermentation and of being resolved, under the action of yeast, either directly or indirectly into alcohol and carbonic acid.

Cane sugar, or *Saccharose*, or *Sucrose*, $C_{12}H_{22}O_{11}$, is the type of a genus or class of sugars—the *Saccharoses;* it is the ordinary S. of commerce, and is by far the most important of this class of compounds: in sweetening properties it exceeds grape-sugar in the ratio of 5 to 2, and milk-sugar in still higher ratio. It has specific gravity of 1·6. It dissolves in about one-third of its own weight of cold water, producing a thick viscid syrup, and in all proportions in hot water; it is slightly soluble in absolute alcohol, but spirit of wine of specific gravity 0·830 dissolves about one-fourth of its weight. By the spontaneous evaporation of its watery solution, it is deposited in four-sided rhomboidal prisms. Common loaf-sugar and sugar-candy ('rock-candy') are two well-known forms of crystallized sugar: loaf-sugar consisting of a mass of small transparent crystals, and owing its dazzling whiteness to the numerous reflections and refractions which the rays of light undergo within the interior from these numberless crystals; while the brown color which rock-candy usually possesses is due to the coloring matter not having been removed from the syrup previous to crystallization. The

crystals of rock-candy are larger than those of loaf-sugar, in consequence of the slower evaporation in the former case. When crystals of S.—e.g., two pieces of loaf-sugar—are rubbed together in the dark, a pale, phosphorescent light is evolved. If a solution of S. be boiled for a long time, it acquires an acid reaction, and loses its power of crystallizing—a change which is attended by the assimilation of additional water, and the formation of the uncrystallizable invert-sugar. This is a mixture, in equal parts, of dextrose or grape-sugar with lævulose or fruit-sugar ($C_6H_{12}O_6 + C_6H_2O_6$): it can be resolved into pure dextrose and pure lævulose by the action of slaked lime, with which is formed a solid calcium-lævulose compound, while the dextrose remains in solution in the precipitate and can be separated by pressure; the lævulose-calcium salt, when suspended in water and decomposed by carbon dioxide, is filtered and concentrated by evaporation.

The action of different degrees of heat on S. has been carefully studied. At about 320° F., saccharose fuses; and on cooling forms the transparent amber-colored solid known as *barley-sugar*, which, if kept for a long time, assumes a crystalline state, and becomes opaque. If the application of heat be continued until about 400°F., the S. loses two atoms of water, and *caramel* (see GLUCOSE) is formed; and at still higher temperature the changes which saccharose undergoes are identical with those suffered by glucose. Cane-S. is very easily oxidized. It reduces silver and mercury salts when heated with them, and precipitates gold from the chloride. Pure cupric hydrate is but slowly reduced by it even at the boiling heat; but in presence of alkali a blue solution is formed, and, on boiling the liquid, cuprous oxide is slowly precipitated. *Fehling's solution*—mixture of copper sulphate and tartaric acid, to which is added an excess of potash—is employed as a test for saccharose and for detecting the presence of glucose. Cane-S. is not *directly* fermentable; but when its dilute aqueous solution is mixed with yeast and kept warm, it is resolved into a mixture of dextrose or Glucose (q.v.) and lævulose or fruit-S., which enter into fermentation, producing alcohol and carbonic acid.

This variety of S. is obtained chiefly from the juice of the sugar-cane; but it is also abundantly present in the juices of many of the grasses, e.g., *Sorghum saccharatum*, whose juice yields 13 per cent. of S.; in the sap of maples and other forest-trees; and in the root of the beet and the mallow. Most sweet fruits contain cane-S., together with lævulose; some, e.g., walnuts, hazel-nuts, almonds, coffee-beans, and St. John's bread, contain only cane-S. Honey and the nectars of flowers contain cane-S. with lævulose; the S. in the nectary of cactuses is almost wholly cane-S.

Other sugars of the Saccharose group are: *Melitose*, obtained from the manna which falls in opaque drops from various species of *Eucalyptus; Melezitose*, found in the 'manna of Briançon,' an exudation from the young shoots of the larch (*Larix Europæa*); *Mycose* or *Trehalose*, found in many fungi associated with glucose; *Milk-S.* or *Lactose;*

and *Maltose*, produced by action of malt-extract on starch. Far the most important of these is *Lactose*, $C_{12}H_{22}O_{11}.H_2O$. It exists in considerable quantity in the milk, especially of the herbivorous animals. It may be obtained on a large scale by separating the curd from the milk, and evaporating the whey till it is ready to crystallize; when, on the introduction of small pieces of wood, the crystals of S. are deposited on them. These crystals are four-sided prisms of a milk-white color, and so hard that they crunch between the teeth. This variety of S. is only moderately sweet, requires about six times its weight of cold water for its solution, but dissolves readily in boiling water, while it is insoluble in alcohol or ether. If it be gradually heated to 284° F., two equivalents of water are expelled, whereas, if it be suddenly heated to about 400° F., all five equivalents are given off. When pure, milk-sugar is insusceptible of fermentation; but when boiled with dilute acids, it is converted into a directly fermentable S., in many respects very similar to grape-sugar. On treating a moderately diluted acid solution of milk-sugar with yeast, this variety is first formed, and then yields carbonic acid and alcohol; if, however, decomposing matters, e.g., casein in the act of disintegration, are present, it undergoes lactic and butyric fermentation; hence we understand how milk after exposure for a time to the air becomes sour. The intoxicating character of the drink prepared by the Kalmucks and Tartars from sour mares' milk is due to this indirect vinous fermentation of S. of milk: see KUMISS. Cows' milk fermented by means of yeast is also called Kumiss. Regarding the uses of milk-S., it may be observed that it is probably the most important of the constituents of whey (which is milk deprived of the whole of its casein except a mere trace held in solution), and hence that it is the active ingredient in the *whey-cure*, popular in Switzerland. (The whey in these cases is usually from goats' milk.) It is also the chief constituent of the globules used in homeopathy.

Sugars of the grape-S. class bear the general name *Glucoses:* the type of these is Grape-S., or glucose proper, called also Dextro-glucose and Dextrose. The formula for all the glucoses is $C_6H_{12}O_6$; and besides Dextrose the class comprises Lævulose or fruit-S., Mannitose, Galactose, and Arabinose. The following substances have the same chemical composition as the glucoses, $C_6H_{12}O_6$, but they are incapable of alcoholic fermentation: Inosite, a substance found in the muscular substance of the heart and other organs of animals, also in the kidney-bean and in certain other plants; Sorbin, in mountain ash berries; Eucalyn, separated in the fermentation of melitose, the sugar of certain species of *Eucalyptus;* and Dambose, obtained by heating, with hydriodic acid, *dambonite*, a peculiar kind of caoutchouc. For Grape-S., see GLUCOSE. Lævulose or fruit-S. is so called because it turns the plane of polarization to the *left* (*lævus*), while *Dextrose* or grape-S. turns it to the *right* (*dexter*). All sugars in solution have the effect of rotating a ray of plane polarized light, passed through them, to the right (dextro-rotation) or to the left (lævo-

rotation). All sugars exert dextro-rotation except Lævulose and Invert-S. Lævulose occurs, together with dextrose, in honey, in many fruits, and in other saccharine substances: the mixture of the two is Invert-S. Lævulose is a colorless uncrystallizable syrup, more soluble in alcohol than dextrose. Cane-S. may be inverted, i.e., transformed into the mixture known as Invert-S., by warming with dilute acids or water, thus:

$$C_{12}H_{22}O_{11} + H_2O = C_6H_{12}O_6 + C_6H_{12}O_6.$$

Among the various chemical purposes to which the phenomenon of rotatory polarization may be applied is its use in determining the quantity of any kind of S. in solution. While some sugars give a right-handed rotation, others give a left-handed rotation, and each S. exerts a definite amount of rotatory power. The following are the rotatory powers of the chief varieties of S., equal weights of each being dissolved in an equal bulk of water, and the temperature being 56° :

Saccharoses ($C_{12}H_{22}O_{11}$):			*Glucoses* ($C_6H_{12}O_6$):		
Cane-sugar, . . .	right	73°	Grape-sugar, . . .	right	57°
Trehalose, ...	"	200°	Lævulose, ...	left	106°
Milk-sugar, . . .	"	59°.3			

This method has been applied to determine the amount of S. in diabetic urine, to ascertain the quantity of S. which remains in the unfermented state in wines, and to other similar purposes. As, however, the process is one of extreme delicacy, the method must be used with great caution.

Although S. is commonly regarded as a luxury, it is in reality a very valuable food (as, indeed, might be inferred from its presence in milk, and in both the yelk and white of eggs), since it is very rapidly digested, and supplies heat-forming or respiratory food to the system. Because S. is a fat-forming substance, it should be taken very sparingly in cases of excessive obesity. There are certain forms of dyspepsia in which S. should be avoided, as exciting increased gastric uneasiness; and in diabetes, all articles of food containing or (like starch) yielding S. should be rigidly prohibited. Although prone to fermentation when in dilute state, in its concentrated form S. possesses great antiseptic power, and is extensively employed to preserve both vegetable and animal substances from decay. The S. naturally existing in some fruits is often sufficient to insure their preservation in a dry state, and in other cases it is added, as in preserves and jellies. A mixture of salt and S. applied to meat, fish, etc., preserves more of the natural flavor than mere salting does. S. converted into caramel is much used by cooks and confectioners as coloring matter.

Manufacture.—The manufacture of S. from the sugar-cane and other sources, one of the largest branches of industry, is of comparatively recent date; and though there are evidences of its very high antiquity in India and China, S. appears to have been only vaguely known to the Greeks and Romans. It is mentioned by Theophrastus as 'honey in reeds;' and Lucan has the following line, which indicates

a knowledge of its existence, but merely as a curious fact

'Quique bibunt tenera dulces ab arundine succos.'

Its introduction to Europe appears to have been one of the results of the Crusades. The sugar-cane was grown in Cyprus about the middle of the 12th c.; it was transplanted thence to Madeira 1420, and to San Domingo 1494, whence it spread to the neighboring islands and the Amer. continent. The art of boiling the cane juice was known in Gangetic India at least as early as the 7th c., for in the first half of that c. it was carried thence into China; and it was not until the close of the 15th c. that a Venetian discovered the art of making loaf-S , which soon became established in Germany. The first refinery of which any notice exists was in Dresden, as early as 1597; but long previous to this the subject had been discussed in learned treatises, e.g., the *Saccharologia* of Sala, in the beginning of the 16th c. Still the manufacture of S. in the countries to which it had been introduced made slow progress, being too expensive for use except by the wealthy. The material has now become one of the commonest necessaries of life, and has largely conduced to the health of nations. Until 1747, sugar was supposed to be the product of the sugar-cane only; but in that year, Marggraf, German chemist, demonstrated that is was a natural product of other vegetables, especially of the beet-root; and half a century later, its manufacture from that source was begun in Silesia. A large portion of the S. consumed on the European continent is now obtained from this source: see BEET-ROOT SUGAR.

In the United States and Canada very much S. is made by boiling the juice or sap of the Sugar Maple-tree (*Acer saccharinum*). The *Sorghum saccharatum*, or Sugar-grass (see DURRA), and the stalks of ordinary maize or Indian corn (*Zea*) yield S., which in quality can rival the best crystallized cane-S. (see SUGAR-CANE).

MAPLE-SUGAR.—Though nowhere conducted on an extensive scale, the manufacture of sugar from the sap of the maple-tree (see MAPLE) is carried on in many of the n. states and as far s. as Ky. The season for this work commences in Feb. or Mar., according to location, and continues three to six weeks. Cold nights followed by mild days are favorable; but as the warmth increases, the yield of sap and the proportion of sugar which it contains are diminished. When about 25 years old, the trees will give good yield of sap, and they can do this every year for 50 years or more without apparent injury. The sap is obtained by boring two or three holes, one-half inch or more in depth, in the trunk of the tree, one or two ft. from the ground, with an auger one-half or three-fourths in. in diameter. Into these holes spouts, eight or ten in. long, are placed, which conduct the sap into pails. In some large maple orchards the spouts lead to troughs which convey the sap to the sugar house; but the common custom is to collect it, every day, in a tank, or in barrels, which are drawn on a sled. It requires about five gallons of sap to make one lb. of sugar. The yield per tree, in an ordinary

grove and an average season, varies from three to six lbs. of sugar, but it is claimed that a few trees have yielded as much as 40 lbs. each. The sap is converted into syrup by boiling in a large kettle or pan placed in a brick or stone arch, or, preferably, in an evaporator, till it reaches the proper consistency, when it is strained and left for a few hours to allow any impurities to settle. It can be more perfectly clarified by the use of milk or the white of egg. The syrup is sold usually in cans. It should weigh 11 lbs. per gallon. By subjecting it to further evaporation, it can be converted into sugar, which can be run into tubs or molds of any form desired. By the process of refining, the distinctive flavor of maple sugar is entirely removed, and the product cannot be distinguished from cane-sugar. In all the operations connected with the manufacture of syrup or sugar the most scrupulous cleanliness should be observed. The first part of the season is the best, as concerns both quantity and quality of product. To prevent the change of a portion of the sucrose (cane-sugar) into glucose, which is not only deficient in sweetness, but also gives the product a rank flavor, it is necessary to evaporate the sap promptly. When properly made, maple-sugar is said to be the purest sucrose found in a natural state. But some of the material sold early in the season under this name is mixed with cheaper cane-sugar, and a great proportion of the maple syrup of commerce is largely adulterated with corn glucose. This adulteration is done principally in the large cities. Accurate statistics cannot be obtained, but the annual product of maple-sugar in the United States is estimated at about 50,000 000 lbs. Vt. and N. Y. are the largest producing states, the former making about 11,000,000, the latter about 10,000,000 lbs. The bounty offered to producers for 14 years from 1891, July 1, by the national govt., of 1¾ cts. a lb. for all sugar testing between 80° and 90° by the polariscope, and of 2 cts. a lb. on all which tests 90°, will probably considerably increase the manufacture of maple-sugar. As an indication of the wide territorial extent of the maple-sugar interest as compared with that of the cane-sugar, it is noted that previous to closing the books for the year applications for license, which would entitle to the bounty in 1892, were received from 3,932 people for making maple-sugar, and 730 for making sugar from cane. Fearing that the govt. inspection would delay sales at the opening of the season, when high prices rule, many of the leading maple-sugar makers did not apply for a license. But the applications made, and the statistics of production, show that while the manufacture of sugar from cane is confined to comparatively few people who do an immense business, that of maple-sugar is carried on by a great number of men, each producing a moderate quantity.

For the manufacture of starch-sugar, see GLUCOSE.

From the beginning of the 16th c., S. has been one of the most important products of the W India islands. Careful cultivation has produced many varieties of this useful plant, some adapted for particular localities. The

original variety introduced into the W. Indies is still cultivated under the name *Creole Cane.* The Otaheite or Tahiti cane is taller, stronger, quicker in growth, and yields greater percentage of S.: the ribbon cane and the Bourbon cane are varieties of the Otaheite cane. There are many other varieties of *Saccharum officinarum*—e.g., the Batavian cane, most prized by rum-distillers; the Chinese cane, a very hardy plant.

The extraction of juice from the sugar-cane is effected by simple pressure. In its native country, India, there are still in use in some districts machines of the rudest construction, probably like those used a thousand years ago. The Chinapatam Sugar-mill consists of a mortar made by cutting down some hard-wood tree to within 2 or 3 ft. of the ground, and hollowing the top of the portion left standing in the ground into the form of a mortar. A

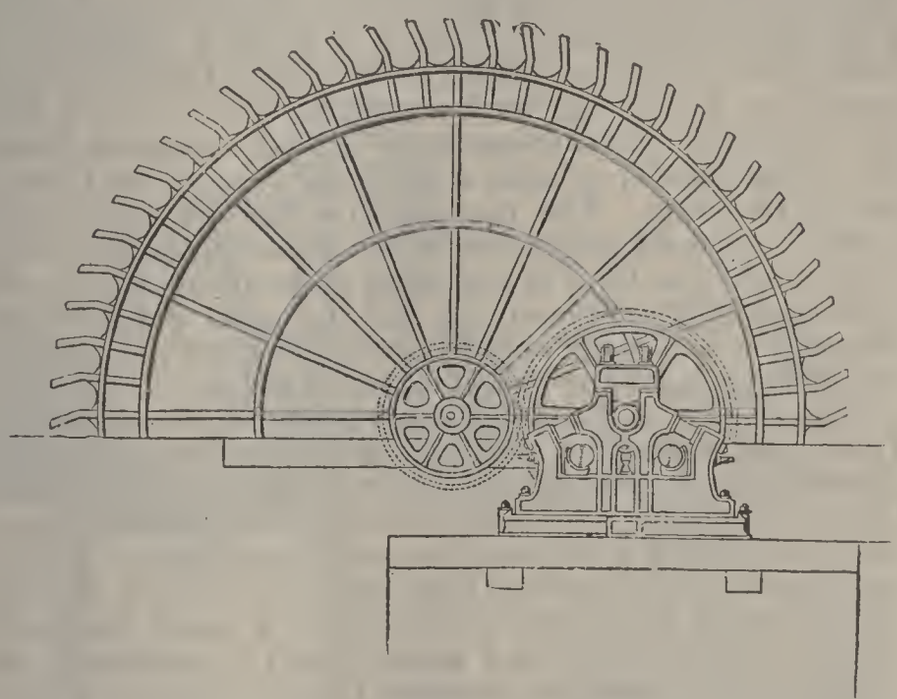


Fig. 1.

small hole is then bored obliquely through from the bottom of the cavity to the outside, and a pipe conveys the juice into a jar. A cylindrical piece of wood, sharpened at each end, acts as a pestle, which is kept in its place with sufficient pressure by a lever and by ropes. Small lengths of freshly-cut cane are placed two or three at a time, in the mortar; and a man sits on the other end of the train, balancing it, and at the same time drives oxen attached to the end of the beam, and keeping the movable parts of the mill constantly turning round. Very large quantities of S. are made by this rude contrivance in India. A much better one is the Chica Ballapura engine, which consists of two upright

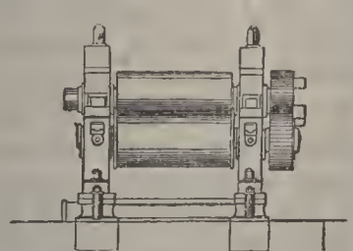


Fig. 2.

rollers, whose heads are formed into double spiral screws, which work in one another, so that when an ox is yoked to the long curved lever and goes around, one of the upright rollers, being connected with the lever, is made to revolve, and its screw carries the other one round, but in the opposite direction. The pieces of cane are fed in by hand between the rollers, and as the juice is squeezed out, it flows down into a small hollow below the frame made to receive it, whence a small trough carries it to an earthen pot. The frame of this mill is securely fixed with stakes driven deep in the ground. Probably this very ancient machine has been the origin of all the most modern ones, for they all consist of rollers placed either vertically or horizontally, between which the canes are made to pass.

The mills now in general use for squeezing the juice out of the sugar-canes are very powerful machines. Fig. 1. represents an end view of a cane-mill, with the iron water-wheel and gearing for driving it, and fig. 2 represents a front view of the same mill. Some idea of the strength of those mills will be formed from the fact that in one mill the three rolls—40 in. diameter, 8 ft. long—weighed 59,000 lbs. The capacity of such a mill is 50 tons of dry sugar a day of 12 hours. The manufacture has probably been carried to greater perfection in the islands of Java, Mauritius, and Cuba than in any other parts of the world. In Java especially, in consequence of the great extent of the plantations, the planters have been able to erect complete establishments for the manufacture of sugar.

The process of S.-manufacture is essentially as follows: The canes, freed from all loose leaves, are passed through between the rollers under the greatest possible pressure that can be brought to bear upon them. From 100 lbs. of canes, 65 to 75 lbs. of cane-juice will be expressed. This juice, which is of sweetish taste, and of the color of dirty water, passes direct from the mill to a small reservoir, where it usually receives a small dose of quicklime, and without delay runs off to large iron or copper vessels, heated either by fire underneath or by steam-pipes in the liquid. As the temperature of the juice rises, a thick scum comes to the top, which is either removed by skimming, or the warm juice is drawn off from below the scum. The concentration of the juice is partly effected in a series of large open hemispherical iron pans, of which five or six are placed in a row, with a large fire under the one at the end. This one fire, which runs along under the whole row of pans, is found sufficient to make two or three of them nearest the fire boil violently, and in addition, it warms the juice in the pans furthest from the fire. As the juice first enters the pans furthest from the fire, it gets gradually heated, and the vegetable impurities rise in scum to the top, and are carefully removed. As the juice is ladled from one pan to the next, it boils with greater and greater vigor as it approaches nearer the fire, until in the pan immediately over the fire it seethes and foams with excessive violence; and this seems to be essential to the successful making of sugar. It is known that

the presence of all those impurities which constitute the scum interferes with the crystallizing of the S.; and the rapid ascent of bubbles of steam through the liquid in the pans carries all impurities dispersed through the body of the liquid to the top, where they can be removed with facility. It is well known that great heat is very destructive to cane-juice; i.e., it turns much of the crystallizable sugar into molasses or uncrystallizable S., but the gain arising from the riddance of much of the impurity in the cane-juice more than compensates for destruction of part of the S. After the concentration has been carried to a given point, and all the scum has been parted with, the application of a high heat, which would act with increasingly destructive effect as the condensation becomes greater, is suspended, and the liquor, now of the color of turbid port wine, and of the consistency of oil, is drawn into the vacuum-pan, where the concentration is completed at the lowest possible temperature, generally about 150° F. The vacuum-pan is generally of copper, of spherical form 6–10

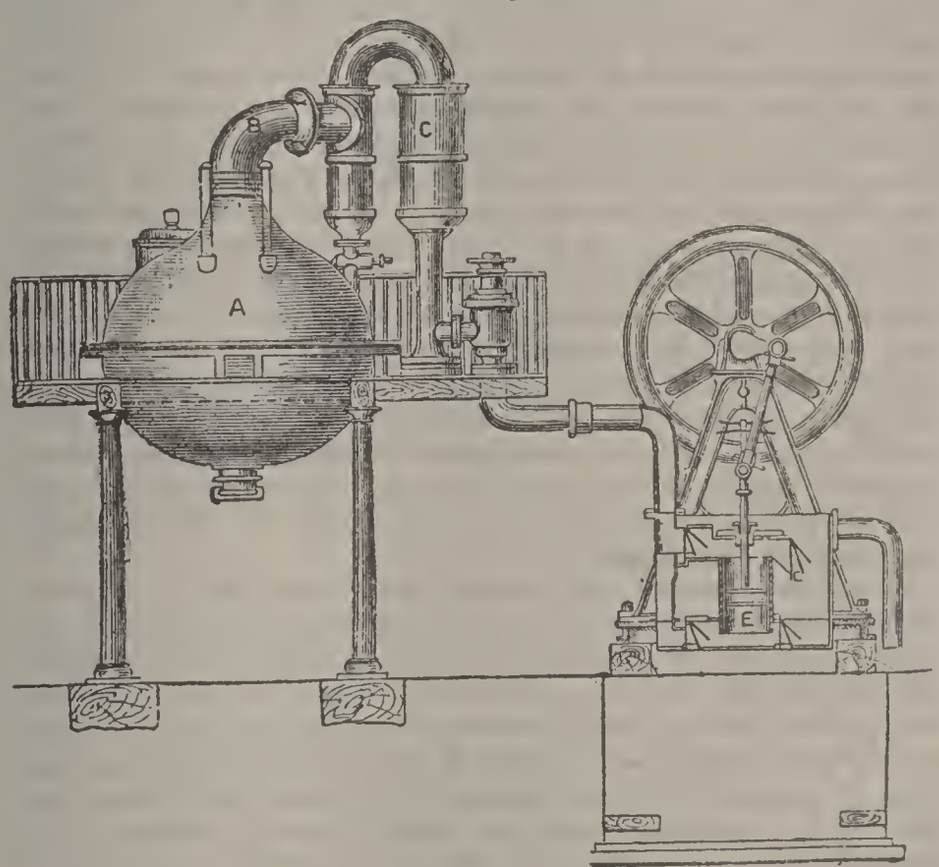


Fig. 3.

ft. diameter. The bottom is double, leaving a space of an inch or two for admission of steam between the two bottoms; and there is generally a long coiled copper pipe of three or four inches diameter above the inner bottom, so as to further increase the amount of heating surface. This apparatus is made perfectly air and steam tight. Leading from its upper dome, A, is a large pipe; B, communicating with the condenser, C, into which a rush of cold water is continually passing, to condense all the steam or vapor that arises from the liquid boiling in the vacuum-pan.

The water which is constantly rushing into the condenser is as steadily withdrawn again by the pump at E. There is thus a constant vacuum in the pan, consequently the liquid in it will boil at a much lower temperature than in an open pan or boiler. There is extraordinary advantage in being able to effect the later stages of the concentration at a low temperature, for it is when the liquid becomes thick that the destructive results of a high temperature become most excessive.

As the concentration of the liquid in the vacuum-pan proceeds, crystals of S. begin to form, and the skill of the sugar-boiler is shown by the uniformity of the crystals. The boiling is commenced by pouring in only about a third or fourth of the quantity that the vacuum-pan will hold, and gradually adding liquid as the crystals increase in size. The sugar-boiler is able to watch the changes going on in the vacuum-pan by means of small samples withdrawn by a suitable apparatus. When the vacuum-pan is full, the contents have thickened, by the formation of crystals of sugar, into a mass of the consistency of thick gruel; it is then allowed to descend into a vessel called the heater, where it is kept warm until it can be run into the 'forms,' which, in the sugar-growing colonies, are generally conical earthen pots, holding one to two cwts. of S. It is allowed to cool and complete its crystallization before the plugs, which close the bottom of the pots, are withdrawn; then one-fourth to one-third of the contents which have remained fluid runs off into gutters leading to large tanks, from which it is again pumped up into the vacuum-pan, and reboiled, yielding a second quality of S. This reboiling of drainings is repeated, with continually decreasing result in quantity and quality of the solid S., and it is rarely carried beyond the fourth boiling. If the planter wishes to obtain Muscovado or unclayed sugar, the process is now complete, and the S. is turned out of the forms, and packed for shipment.

If *clayed* sugar is to be made, the forms are allowed to stand for a few days until all the molasses has drained out; and a quantity of thin clay or mud, about the consistency of thick cream, is then poured over the S. to the depth of one or two inches. The water contained in this thin mud slowly percolates through the S, and mixing with the coatings of molasses still adhering to the outsides of the crystals of S., renders them less viscid, and facilitates their descent to the bottom of the form. The mud remains, at the end of a few days, in the form of a dry hot cake on the top of the S., and none mixes with the sugar.

The process of claying S. is simply washing off a coating of black or yellow molasses from a crystal of S., which is always white. This operation is possible without dissolving the crystal of S., because the molasses has greater affinity for water than the crystallized S. has. Anything that would yield a very slow and steady supply of water to the S., would do as well as mud or clay. There is always some loss of crystallized S. in the process of claying, and attempts have been made to use strong alcohol for

washing off the coatings of molasses from the crystals; but though alcohol dissolves molasses very freely, and scarcely acts on the crystals at all, it has not been found suitable commercially; and, besides the cost of the process, there is difficulty in riddance of the smell of alcohol from the sugar.

The centrifugal machine is designed to separate the molasses from the S.: by its use is accomplished in a few minutes work that would require days by the method of draining. Its action depends on precisely the same principle as that called into play when a sailor twirls a mop to expel the water from it. The centrifugal machine is a drum 3 or 4 ft. diameter, 12 to 18 inches high, revolving at great velocity on a vertical axis. The S., either direct from the vacuum-pan, or after it has been allowed to cool, is put, still mixed with the molasses, into the machine. As soon as the drum acquires high velocity, its contents are forced by the centrifugal action against the drum, the cylindrical portion of which is made like a sieve, and admits of the escape of the molasses, but retains the crystals of S. In a machine of three ft. diameter, revolving at the speed of 1,000 revolutions per minute (a speed of 1,700 revolutions is attained in some machines), the tendency of the molasses to escape will be 514 times its own weight; that is to say, it will have 514 times more force to fly off, than it has to drop off the crystal by the mere force of gravity.

In *Sugar-refining* the chief difficulties arise from the fact that the material to be operated upon is ever varying in quality. Not only is there a difference between the product of two different plantations, but even the manufacture of the same plantation shows differences of quality —arising chiefly from the presence of foreign substances, which interfere with the refining. Attempts to test the exact quality of solutions of raw S. by means of polarized light (see above) have had little success. Sugar-refining has three distinct objects—(1) production of loaves of thoroughly refined S.; (2) crushed S.; (3) white S. in separate crystals. Sugar-refining is carried on in this country on a great scale. There is very little raw S. used. Nearly all the yellow and dark-colored S. in the shops has passed through the hands of the refiners, and is simply inferior S., made of the syrup which drains from the white loaf-sugar.

Sugar-refineries are built eight or nine stories high, and the raw S. is first hoisted to the upper story where it is dissolved in large tanks of hot water, but with use of a small quantity of water. A quantity of bullock's blood is stirred into the solution of S., and the heat being gradually raised, the albumen of the blood coagulates, and rises to the surface in thick light scum, bringing with it nearly all the mechanical impurities floating in the fluid. The liquor, still hot, is then passed into the bag-filters, which are of very closely woven cotton cloth, capable of retaining the minutest mechanical impurity. To facilitate the passage of the liquor through the bags, they are suspended in a kind of iron closet, and surrounded by an atmosphere of steam

to keep the liquor hot. From the bag-filters, the liquor, freed from all mechanical impurities, but of dark color, flows into a lofty cylindrical iron filter, filled with animal charcoal, i.e., charcoal of bones. This charcoal is reduced to coarse powder; and the dark offensive liquor is allowed to percolate very slowly through the mass. The result is that it flows out at the bottom a perfectly transparent and pure solution of S. The charcoal can be used for only a few days at a time, because it gradually loses its purifying power; when the liquor begins to flow through it without being purified, it is taken out and reburned, which completely revives its powers.

The liquor as it flows from the charcoal filter is a mixture of pure S. and pure water, perfectly transparent. The application of heat is the only mode of expelling the water, and this unfortunately blackens the sugar again. For riddance of the water with as little heat as possible, the colorless liquor is boiled in the vacuum-pan as in the early process of the manufacture (see fig. 3). The liquor boils in vacuo at about 150° F., and even this moderate heat has the effect of turning it brown. When it has been sufficiently concentrated (in 1¼ to 2½ hours), it is run into the sugar-loaf forms, which, after cooling, are carried to a room kept warm by steam-pipes: this warmth facilitates the flow of the syrup out at the aperture at the bottom of the form. For riddance of the coating of colored syrup which still hangs about the crystals of S., a small quantity of saturated solution of pure white sugar is poured on the top of the form. This strong liquor is unable to dissolve any more S., but, being more fluid than the sticky coatings of syrup adhering to the crystals, it mixes with the coatings, and makes them fluid enough to flow down to the bottom of the form, leaving the crystals clear of syrup, consequently free of all color. The loaves of S., after standing some time, to admit of all the liquor draining off, are wrapped in paper, and dried in stoves heated by steam. The liquor draining from the forms is reboiled in the vacuum-pan, and forms loaves of inferior quality; and the liquor draining from the inferior loaves is again boiled into the yellow sugars known among sugar-refiners as bastards.

Crushed Sugar is simply inferior loaves crushed while still soft and moist, and packed in hogsheads, instead of being left in the loaf form. Granulated S. is produced by stirring the syrup while it is crystallizing; thus the S. is formed into small crystals or grains, instead of being compacted into a solid mass.

The syrup which drains from refined S. is reboiled, and is the *Golden Syrup* of the shops.

Crystal Sugar.—In making the S. crystals, all the processes are as in refining, until the syrup is clarified. Then it is boiled or concentrated in a vacuum-pan of larger size than ordinary, and the concentration is carried on until minute crystals appear. Fresh syrup is then added from time to time, great care and experience being requisite to insure regular feeding of the first-formed crystals, and to prevent formation of a second crop. When the crystals

are large enough, the contents of the pan are transferred to the centrifugal machines, which quickly separate the crystals in a perfectly dry state from the uncrystallizable syrup. The crystals are of square tabular form, with a deep groove across in one direction, dividing the crystal into equal parts. This kind of sugar is much liked for coffee, etc., but the crystals dissolve slowly.

Commerce.—The sugar trade of the world has become so great that international agreement has been necessary to regulate it. European countries for quite a number of years have paid directly and indirectly bounties to sugar producers and refiners on their exports. This encouraged and abnormally developed the sugar industry in some countries and depressed it in others. The bounties placed the price of sugar so high that the poorer people in bounty-paying countries could not afford it and so low in many non-bounty-paying countries that the industry was no longer profitable to producers. A movement was started in England in 1887 to correct this evil. A convention representing Austria, Belgium, Germany, Great Britain, Italy, the Netherlands, Russia, and Spain, met in London Aug. 30, 1888, and passed a resolution to guarantee 'that no open or disguised bounty shall be granted on the manufacture or exportation of sugar.' France would not enter the agreement because the United States would have nothing to do with it. There was no ratification of this convention, though it should have taken place Aug. 1, 1890. The bounties paid by Germany and Austria-Hungary were reported to be about $16 per ton, and this was approximately doubled in 1896. Renewed efforts were then made to break up the bounty system, and this was practically accomplished, temporarily at least, in Brussels, Mar. 1, 1902, after eight sittings of an international convention. This was the eighth European sugar bounty conference since one held in Paris in 1862. Germany, Austria-Hungary, Belgium, Spain, France, Great Britain, Italy, the Netherlands, and Sweden were represented in the convention of 1902.

Production.—The following figures show the world's production of sugar in tons:

Years.	Cane.	Beet.	Total.
1840	1,100,000	50,000	1,150,000
1850	1,200,000	200,000	1,400,000
1860	1,830,000	400,000	2,230,000
1870	1,850,000	900,000	2,750,000
1880	1,860,000	1,810,000	3,670,000
1890	2,580,000	2,780,000	5,360,000
1897	2,430,000	4,780,000	7,210,000
1898	2,850,000	4,650,000	7,500,000
1900	2,839,500	5,608,544	8,448,044
1905	4,906,082	7,237,717	12,143,799
1906	6,733,626	7,217,366	13,950,992
1907	7,343,444	7,143,818	14,487,262

The average consumption each year in the United States is about 75 pounds per capita. In Great Britain it is over 90 pounds per capita.

SUGAR-BEET (*Beta vulgaris*): root, grown largely in Europe, and to some extent in this country, for production of sugar (see BEET-ROOT SUGAR: BEET). The quality of the root is varied greatly by soil and climate. A summer temperature much exceeding 75° is unfavorable. The land should be rich, manured and plowed the autumn previous to sowing, and again plowed in the spring. The latter plowing should be to a depth of 9 inches, and a subsoil plow should loosen the ground 5 or 6 inches deeper. Fresh yard manures should never be applied near the time of planting. Commercial fertilizers (see FERTILIZERS) containing considerable nitrogen and phosphoric acid with a large percentage of potash are highly beneficial. The soil must be finely pulverized. Planting is to be done as soon as the ground is dry and warm in the spring. Rows are to be about 18 in. apart, and, though the planting should be close, the beets should be thinned to stand 6 to 9 in. apart in the row. Very large roots are not desirable. An average weight of 1 lb. is sufficient. Cultivation must be frequent, and so thorough as to keep down all weeds. Where large quantities of the roots are grown, special machines for planting and cultivation are used. When mature, the roots are harvested. This work is sometimes done by hand, but various forms of the plow have been invented which loosen the roots so that they can be taken from the ground quickly and easily. The leaves are removed, and the roots taken to the factory, or stored in piles or houses in such a way as to prevent injury from rain or frost. Care is also required to avoid heating when large quantities are stored. The yield varies greatly, but 10 to 15 tons per acre are often obtained, and very much larger yields are frequently reported. The quantity of sugar usually varies from 8 to 15 per cent., but sometimes exceeds the latter proportion. The quality of the sugar is fully equal to that from sugar-cane. In order to be made profitable, the manufacture of the sugar must be on a large scale. The molasses from the beet-root is useful only as a fertilizer. The pulp, matter left after the sugar is extracted, is of some value for feeding to animals. Careful experiments indicate that the beet can be successfully grown for sugar in the United States through a zone about 200 m. wide, reaching from the Atlantic to the Pacific, including portions of New England, n. N. Y., Penn., O., Ind., Ill., and Wis.; s. Io., and portions of Neb., the Dakotas, and Cal. A bounty for production of sugar from the beet is paid by the national govt. and by some of the states. The greatest success in producing sugar from the beet-root in this country to 1891 has been in Nebraska. The total production in the world of sugar from the beet-root for the year 1890 was estimated at 3,600.000 tons, of which more than ⅓ was made in Germany. The sugar-beet is valuable for feeding to cattle, but many farmers prefer the mangel-wurzel on account of its larger yield (see MANGEL-WURZEL).

SUGAR-CANE (*Saccharum*): genus of grasses, native to tropical and subtropical countries. The true S.-C. or Common S.-C. (*S. officinarum*) is not found wild, but is supposed to be a native of s.e. Asia. It was brought to s. Europe by the crusaders, and in the 15th and 16th c. found its way into all European colonies within the tropics. In Europe its cultivation has always been very limited, and is scarcely practiced except in Sicily and Andalusia. In China it extends to 30° n. lat., and in N. America to 32°; in the southern hemisphere only to 22° s. lat. It is perennial, but is killed to the ground by frost. The culms or stalks grow from a creeping root, are 8 to 20 ft. high, 1 to 2 in. thick, have well-marked joints 3 to 9 in. apart, and ribbon-shaped leaves 3 to 4 ft. long and 2 in. wide. As it approaches maturity, the cane throws up a smooth joint, 7 to 8 ft. long and ½ in. in diameter, called the arrow, which produces a long and handsome panicle of flowers. The saccharine juice, which gives the plant its commercial value, is contained in the pith which fills the ripened stalk for about two-thirds its length. Though there is a wide difference in their appearance, it is probable that the numerous varieties all belong to one species. The Creole, on account of the place of its introduction often called the Madeira cane, has been long cultivated. The Otaheite, including the ribbon and the Bourbon, is earlier, larger, and produces more sugar. The Batavian, from Java, is grown to some extent, and the Chinese (see below, CHINESE SUGAR-CANE) is cultivated farther n. than the ribbon cane succeeds. The S.-C. thrives best in the tropics and near the ocean, but is usually profitable as far n. as lat. 32° except on uplands where the mean temperature falls below 66°. The plant does not perfect its seed either in this country or the W. I. Propagation is effected by cuttings, which are usually taken from the main stalk and should be secured from the finest canes. They are put out in summer or autumn, according to the climate, in rows 5 or 6 ft. apart, and 2 ft. apart in the rows. The soil should be deep, fertile, and well drained, and cultivation should be sufficiently thorough to keep down all weeds. Chemical fertilizers are superior to manures.

Sugar-cane (*Saccharum officinarum*).

The latter are never to be used in a fresh state. Nitrogen is an essential element, but in excess it injures the cane for sugar production. It should not be used alone, but should be combined with mineral elements, and it is equally important that with the latter nitrogen should be employed. Potash in large quantities increases the yield of cane, but not the percentage of sugar which it contains. Phosphoric acid is one of the principal elements needed to make a good crop. As the plant ripens, the stem becomes hard, the leaves change color, and the juice thickens. The canes are cut close to the ground, the tops and leaves removed, and the jointed portion taken to the mill. Sprouts, called ratoons, grow from the roots, and furnish a new crop of canes. In this way a plantation can be maintained for several years; but as there is rapid decrease in the size of the cane, it is found best to make frequent renewals. From 12 to 20 per cent of the weight of the cane, without tops or leaves, is sugar, but a portion of this is glucose, and quite a percentage is lost in the process of milling. The diffusion process, recently introduced, enables the manufacturer to secure a larger proportion of the sugar which the stalks contain. The yield of sugar varies from 500 to 2,000 pounds per acre in Louisiana, and in the West Indies is said sometimes to exceed 7,000 pounds. Among the enemies of the sugar-cane are rats, white ants, borers, and lice. They often cause heavy loss to the planter.—Sugar-cane was brought to this country from San Domingo about 1751 by Jesuits, who planted it on the banks of the Mississippi above New Orleans. The cane was ground by cattle till 1822, when steam-power was employed; and till quite recently the machines and processes used in expressing the juice and manufacturing the sugar have been very imperfect. Nearly all the sugar-cane grown in this country is produced in three states, Louisiana, Texas, Florida. The government estimate of the production of sugar from sugar-cane in the United States for 1906 was 544,320,000 pounds; total production of sugar from sugar-cane in the world (1908) estimated 7,218,000 tons.—CHINESE SUGAR-CANE, often called sorghum (*Sorghum saccharatum*), a variety of durra (see DURRA), can be grown in any latitude suitable for Indian corn, and in a drier climate. It thrives better n. than it does far s. It is planted in May, in well-prepared ground, and in rows 3½ ft. apart, with hills 2 ft. apart in the row. On low land, and in latitudes where the summers are short, the early-maturing varieties are to be preferred. Frequent but rather shallow cultivation should be given. Chemical fertilizers seem to give better results than farm-yard manures. If a large proportion of phosphoric acid is used, the ripening of the plant is hastened; but in excess it reduces the percentage of sugar in the juice. Nitrogen and potash must be supplied. The latter gives strength to the stalks and increases the quantity of sugar which they will yield. The quality of the plant varies greatly with

the climate and soil in which it is grown. In warm regions it deteriorates rapidly, and even in cool climates it requires careful selection and cultivation. There are many varieties. Of these, some were obtained from China, the Imphee sorts from Africa, and many have been originated here by crossing different kinds. The plant should ripen, and be harvested before frost. When it approaches maturity, the leaves are to be removed, and the stalks cut close to the ground. The plant resembles Indian corn; grows, in good soil, 7 to 16 ft. high; but seldom matures its seed farther n. than latitude 41°. Nearly 50 per cent of the ripened stalk is juice. Of this 5 to 10 gallons are required to make a gallon of syrup. The yield varies greatly, but often exceeds 150 gallons per acre. Great difficulty has been experienced in separating the sugar from the other elements of the juice of the plant without seriously injuring the quality of the product, but the results of recent experiments with alcohol for precipitating the gums are quite encouraging. Syrup can be readily obtained wherever the plant thrives, but no method has yet been devised by which sugar can be profitably made on a small scale. When thickly planted, the stalks are of considerable value for green fodder, but to cure for winter use the cane is far inferior to Indian corn. Where the seed ripens, it is considered nearly equal in value to corn for feeding to cattle, sheep, and swine.—The cane was grown in France for some years previous to its introduction to this country 1856. The Imphee, from Africa, was brought here the following year, but it has never become as popular as the Chinese cane.

SUGAR OF LEAD. See LEAD.

SUGAR LOAF, THE: an isolated, conical hill, rising from the east bank of the Hudson river, a short distance below Garrisons. It is at the north entrance to the Highlands, about 57 m. n. of New York.

SUGAR MAPLE. See MAPLE.

SUGESCENT, a. *sū-jĕs'sĕnt* [L. *sugĕrĕ*, to suck]: in *OE.*, of or relating to sucking.

SUGGEST, v. *sŭg-jĕst'* or *sŭ-* [L. *suggestus*, carried or brought under—from *sub*, under; *gestus*, pp. of *gero*, I carry]: to offer to the mind or thoughts; to hint or refer to; to intimate or mention in the first instance; in *OE.*, to tell privately or secretly; to tempt; to seduce. SUGGEST'ING, imp. hinting; intimating. SUGGEST'ED, pp. SUGGEST'ER, n. *-ĕr*, one who suggests. SUGGEST'ION, n. *-yŭn* [F.—L.], something offered to the mind or thoughts; a hint; private information; in *OE.*, secret incitement; temptation. SUGGEST'IVE, a. *-jĕs'tĭv*, affording matter for thought or reflection; containing a hint.—SYN. of 'suggest': to hint; allude; refer to; glance at; insinuate; intimate.

SUGGESTION, in Psychology: (1) a narrowing of

the mind upon some (2) external stimulus and (3) a response to the stimulus (4) without deliberation. The (1) narrowing of the mind may be such that the attention is fixed upon a single relationship of a single stimulus, while everything else is excluded from consciousness. The (2) external stimulus may be words spoken or written, some act seen or anything which might lead to a response. The (3) response is ordinarily an act, but may be the formation of a new belief or conception. The (4) response follows at once without calling up any contradictory or inhibiting ideas.

Suggestion is an important factor in the life of all, but is found in extreme form in primitive peoples and children. The average individual seldom deliberates, but his actions dependent upon suggestion are frequent. Every idea tends to actuate or realize itself. Every idea of an action tends to produce that action; every idea of a function (e.g., salivation, rapidity of heart action) tends to produce that function; every idea which enters the mind tends to be held as true and to result in the appropriate response. Suggestion is therefore but an expression for the dynamic nature of mind.

The degree of the suggestion depends upon (a) the definiteness of the thing suggested; (b) the intensity of the suggested idea; (c) and the absence of inhibiting ideas. (a) If my dinner companion gives the suggestion that I pass him the salt, I respond at once without consideration. If the idea were presented that I behave myself more politely at the table, no act would result without some deliberation. (b) Certain ideas correspond to our instincts or our experience and lead at once to a single act or an emotion. Other ideas impress us but little, and do not tend to lead to immediate action as do the more vivid ones. The idea that the child may be in need is an intense suggestion to a mother. During the infancy of the child the idea of protecting her own health may have but little power of suggestion, as the idea lacks intensity at that particular time. (c) Certain ideas tend to associate to themselves other ideas which stop action. Thus, the idea of jamming my fist through the window pane calls to my mind the ideas of bleeding hands, painful wounds, expense of replacing the window, shame for performing a foolish act. These ideas come in such profusion and persistency that the original idea is completely inhibited and fades from the mind. The idea of rubbing the end of my nose calls up no such inhibiting ideas, so that if when alone I think of rubbing my nose the act follows before any contradictory ideas have a chance to arise.

Hypnotism is a condition produced by suggestion, and when thus induced exhibits the most perfect working of suggestion. The mind is then focused upon the idea suggested by the operator, and an immediate response is secured without any delay for contradictory ideas to arise in the mind of the subject. Dreams show that a

light sleep is a condition favorable to suggestion. The beginning of dreams is probably always due to suggestion, even though the later stages of the dream be explained by the laws of ordinary association of ideas. The acts of companions have a peculiar suggestive power, and when the companions become sufficiently numerous to form a crowd, and when all are performing the same act, the suggestion may become irresistible. Emotions narrow the consciousness and give peculiar power to the ideas which enter the mind. Hence, the emotions also favor the action of suggestion. See HYPNOTISM; IMITATION; MIND CURE; ASSOCIATION OF IDEAS.

SUHM, *sôm*, PETER FRIDERIK: Danish historian: 1728, Oct. 18—1798; b. Copenhagen; of an ancient and noble family. He graduated in law at the University of Copenhagen 1748. He wrote numerous works on the early mythical and political history of Denmark; and edited *Scriptores Rerum Danicarum Medii Ævi*, IV.—VII. (Hafniæ 1776-92). In 1796, in return for a pension from the government, he transferred to the Royal Library of Copenhagen his valuable library of 100,000 vols. Many valuable manuscripts were printed at his sole charge; also he founded scholarships, and aided many poor students. Suhm's writings were brought out by S. Poulsen, 16 vols., 1788-99.

SUICIDE: the act of intentionally destroying one's own life, whether sane or insane—the act in itself, accompanied by the purpose, is suicide; the condition of sanity or insanity bears on the question of responsibility. In considering the causes which lead to suicide it may be well to mention the motives which deter from it. First of all is the natural love of life, which leads even condemned criminals, perhaps awaiting death by torture to cling to the few hours or days remaining to them. This love of life is in the very nature of all living beings, and it is not always or even usually to be measured by the apparent value of existence to the individual. It is at least as strong in the Digger Indian or the Kongo negro as in the civilized and well-to-do resident of America or Europe. There is next, among the more intelligent, whether religiously inclined or not, the sense of duty to others; among the strictly religious, there is the dread of punishment beyond the grave, and statistics indicate that this is a potent and prevalent deterrent from self-destruction.

Suicide is not in itself a sign of weakness of intellect. There were periods of depression in the revolutionary struggle when Washington was despondent almost to the point of welcoming death, and Bismarck once contemplated suicide. Napoleon, after his first overthrow, attempted suicide by taking poison. Hannibal committed suicide.

Although there are no statistics for comparison, yet the observations of trustworthy narrators indicate that

suicide is very much more common among Asiatics than among western nations. Arthur H. Smith, D.D., says there are parts of China in which young girls band themselves into a secret league to commit suicide within a certain time after they have been betrothed or married; that the practice of suicide 'is adopted even by children, and for causes relatively trifling. At times it appears to spread like the smallpox, and the thirst for suicide becomes virtually an epidemic.' China is probably the only country in the world in which criminals are permitted, or rather directed, as an act of special grace, to commit suicide. Before the Japanese adopted civilized methods, and abolished their old barbarous customs, suicide was also very prevalent among them, the usual form being known as 'hari kari,' the victim disemboweling himself with knife or sword. In India vast numbers of fanatics sought death under the car of Juggernaut, and widows on the funeral pyres of their husbands, until the British authorities put a stop to these practices.

It is yet an undecided question whether education fosters the tendency to suicide or not. It cannot be alleged that education has anything to do with the epidemics of suicide among Chinese women. On the other hand, it is easy to suppose, and statistics appear to support the presumption, that, other things being equal, a prevalence of materialism, a disbelief in things supernatural, and consequent loss of assurance that privations and sufferings here are to be recompensed by an eternity of happiness hereafter, tend to make men tired of life and willing to anticipate by a few years their inevitable destiny. Bismarck said that 'if this world were the end of all, it would not be worth the dressing and the undressing.' So far, therefore, as education helps to promote materialism, it promotes suicide. At the same time it is to be remembered that such men as Tyndall and Darwin, who were avowedly in discord with accepted religious tenets, regarded it as a duty and a pleasure to live and do their share of life's work.

Prof. Bailey, of the social science department at Yale, after examining 10,000 cases of suicide, arrived at the following conclusions:

'Three and one-half males commit suicide to every female. From 30 to 40 is the popular suicide age, and the married are more apt to do away with themselves than the single. Among the single the maximum number of cases is between 20 and 30; among married persons between 30 and 40; among widowers between 60 and 70, and among divorced persons the same. In this country shooting is the favorite method of suicide, poisoning being a close second. Hanging is more popular in northern Europe, and drownings in southern countries. In Maine most of the suicides hang themselves; in the cities they jump from buildings or bridges, poison themselves or turn on the gas; in the south they shoot themselves. Women drown themselves, use poison and gas. Women

as a rule commit suicide in such a way as to avoid injuring their features. Young persons seem to prefer poison; the middle aged shoot themselves and older people hang themselves. Despondency leads as the cause of suicides in America.'

Suicide is most common among the widowed and least frequent among the married. The military profession furnishes much the largest proportion of suicides in all countries, being usually twice or thrice that of any other calling, and in Italy fourteen times larger than the average; next comes domestic service; next come the liberal professions. 'The proportion of suicides in all Europe is greater among the condensed population of urban centres than amongst the more scattered inhabitants of the country' (Morselli). But the proportion is not precisely according to the density of population. Denmark stands highest in Europe (285 per million of population), Germany, north and south, next (from 150 to 165), Norway and Sweden next (128), Great Britain, her colonies, and the United States at 70 per million.

New York is the only American state in which attempted suicide is prosecuted as a crime. In England attempted suicide is also criminal, and the body of a person found to have committed suicide while sane is debarred from Christian burial. The feelings of relatives are almost invariably spared, however, both in America and England, by a verdict of the coroner's jury that the act was the result of insanity.

SUIDÆ, *sū'ĭ-dē:* family of mammalia, non-ruminant Artiodactyla, having the feet generally four-toed, hinder feet sometimes three-toed; toes hoofed, the two front toes forming the principal part of the foot, the others smaller and scarcely touching the ground; the snout abruptly truncated, mobile, muscular, and sensitive, but not elongated into a proboscis; the tail short, or almost lacking; the incisor teeth variable in number, the lower ones all directed forward, the canines projecting, and bent upward; the stomach little divided. To this family belong hogs, wart-hogs, peccaries, etc.

SUIDAS, *sū'ĭ-das:* name given to the compiler of a *Lexicon* during the Byzantine empire. When he lived, or who he was, or whether he was even called Suidas, no one can say; but it is customary to place him about the 10th or 11th century. Eustathius (12th century) often quotes him. The *Lexicon* has this note prefixed: 'The present book is by Suidas, but its arrangement is the work of 12 learned men;' and though we can fix the date when several of the articles *must* have been written, it is impossible to ascertain whether they are the composition of the first compiler or of a later editor. The work is a sort of cyclopedia, giving an explanation of words, and notices of persons, places, etc., in alphabetical order. It is utterly without literary or critical merit, but is valuable to scholars for its numerous extracts from ancient

Greek writers, grammarians, scholiasts, and lexicographers, whose writings in many cases have perished. The first edition appeared at Milan (1499); since, the best editions have been those of Küster (Camb. 3 vols. 1705), Gaisford (Oxf. 3 vols. 1834), Bernhardy (Halle 2 vols. 1834), and J. Bekker (Berl. 1854).

SUI GENERIS, phrase, *sū'ī jĕn'ér-ĭs* [L.]: of his or its own peculiar kind; singular; unique.

SUI JURIS, *sū'ī jô'rĭs* [L., of his own right, i.e., having right to act for himself]: in the Roman law, condition of a person not subject to the *Patria Potestas.* The paterfamilias was the only member of a family who was *sui juris,* all the rest being *alieni juris,* including sons, unmarried daughters, the wife, and the wives and children of the sons of the paterfamilias. A daughter, on her marriage, passed into the family of her husband; but a son did not become *sui juris* by marriage. A son or unmarried daughter became *sui juris* on the death of the paterfamilias. In his father's lifetime, a son could become *sui juris* only by emancipation. The laws of the Twelve Tables declared that a son three times sold by his father should be freed from his power; and the ceremony of emancipation was of the nature of a fictitious sale performed three times, in order to liberate the son from parental control. *Connubium* being the foundation of the *patria potestas,* a bastard was *sui juris.*

SUING. See under SUE.

SUINT, n. *sô'ĭnt* [F. *suint*]: a peculiar fatty matter, rich in potash, which is found in wool, often in large proportions.

SUIR, *shôr:* river of Ireland, rising in north Tipperary, flowing s. through that county by the towns of Thurles and Cahir. Ten m. s. of Cahir it bends e., forming the boundary of Tipperary and Waterford, and passing by Clonmel and Carrick. It then passes out of Tipperary, and meeting the Barrow at Passage, Waterford, enters the sea in Waterford Haven, after a course of about 100 m. It is navigable by barges as far as Clonmel.

SUIT, n. *sūt* [F. *suite,* a following, a set of things following in one arrangement—from L. *secta,* a following, a sect, and also in mid. L. a suit at law, a suit of clothes, etc.—from L. *secūtus,* followed; *sequi,* to follow]: a number of things used together, as a suit of clothes; a set of the same kind, as a suit of cards; petition, prayer, or request; address of entreaty; courtship; an action at law; in *OE.,* attendance of tenants at the court of their lord; suit-service; regular order: V. to agree together, as things made on a common plan; to fit; to adapt; to please; to make content; to agree or correspond; to match or tally; in *OE.,* to dress; to clothe. SUIT'ING, imp. SUIT'ED, pp. SUIT'ABLE, a. *-ă-bl,* fitting; agreeable to; appropriate; proper; becoming; answerable. SUIT'ABLENESS, n. *-nĕs,* the quality or condition of being suit

able; fitness. SUIT'ABLY, ad. *-blĭ.* SUIT'OR, n. *-ėr,* one who sues; one who attends a court of law as a plaintiff or defendant; a petitioner; a wooer; a lover. SUIT'RESS, n. fem. *-rĕs,* a female applicant. TO FOLLOW SUIT, to play a card of the same kind as that on the table; hence, to do as the others do, or follow their example. OUT OF SUITS, having no correspondence; out of harmony.—SYN. of 'suit, v.': to agree; fit; accord; comport; correspond; answer; coincide; concur;—of 'suitable': proper; becoming; correspondent; competent; agreeable; congruous; compatible; consistent; consonant; peculiar; particular; seemly; just; right; commodious; handy.

SUITE, n. *swēt* [F. *suite,* a succession, a retinue (see SUIT)]: a set of apartments; a body of attendants or followers; retinue; company.

SUIT IN CHANCERY: process corresponding to an action in a court of law. See CHANCELLOR; CHANCERY, COURT OF.

SUKKUR, India: a town of Bombay, in the Shikarpur district of Sind, on the right bank of the Indus, opposite Rohri, with which it is connected by the great cantilever bridge of the Northwestern railway. It has public offices, a civil hospital, dispensary, and an Anglo-vernacular school. A considerable local and transit trade is carried on, but no special manufacturing industries. Pop. (1901) 31,316.

SUL, RIO GRANDE DO. See RIO GRANDE DO SUL.

SULCATE, a. *sŭl'kāt,* or SUL'CATED, a. [L. *sulcātus,* furrowed; *sulcārĕ,* to furrow—from *sulcus,* a furrow]: in *bot.,* furrowed or grooved; having a deeply furrowed surface. SULCIFORM, a. *sŭl'sĭ-fawrm* [L. *forma,* shaped]: furrowed.

SULEIMAN PASHA: Turkish military officer: b. 1840: d. 1892. After entering the army he was made a major in 1867; colonel in 1873, and general of brigade in 1874. In 1876 he distinguished himself as commander against the Servians. When the Russians declared war (1877) against Turkey, Suleiman checked them at Eski Zagra, and destroyed his army in heroic but vain attempts to force them from the Shipka Pass. In October he was appointed commander-in-chief of the Army of the Danube, but failed to accomplish anything, retreated behind the Balkans, and suffered defeat near Philippopolis (Jan. 1878). Brought before a court-martial, he was condemned to be degraded and kept in a fortress prison for 15 years. The sultan, however, pardoned him.

SULIMAN MOUNTAINS, India: a range of the northwest frontier province, near the Afghanistan frontier. The range consists of several parallel ridges, of which the most westerly form the water-parting between the rivers flowing east to the Indus and those flowing westward through Afghanistan. It extends north and south from the Safed Koh to about the Bolan Pass, and is crossed by many passes, of which the chief are those of Kuram, Gumal, and Sangar.

SULIOTS, *sū'lē-ots:* tribe who inhabited the valley of the Acheron, in the pashalik of Janina (*Epirus*) in European Turkey; a mixed race, partly of Hellenic, partly of Albanian origin. They are descendants of a number of families who in the 17th c. fled from their Turkish oppressors to the mountains of Suli (whence their name). In this obscure corner of the Turkish empire they prospered, and toward the close of the 18th c., numbered 560 families inhabiting 90 hamlets. For about 15 years they heroically resisted the encroachments of Ali Pasha (q.v.) of Janina upon their independence, even the women taking part in the strife. Vanquished 1803, they retreated to Parga, and afterward to the Ionian Islands, where they remained till 1820, when their old oppressor, Ali Pasha, hard pressed by the Turks, invoked their aid, offering them guarantees for his faith, and his grandson as a hostage. Eager to return to their cherished home, they accepted these terms, and under Marcos Bozzaris (q.v.) maintained a long and desperate conflict with the Turks, but were ultimately forced again to flee from their country, and take refuge to the number of 3,000 in Cephalonia, though a large remnant preferred to skulk in the neighboring mountains. Though they took a glorious part in the war of Greek independence, their country was not included by the treaty of 1829 within the Greek boundary-line; but most of them established themselves in Greece, where their leaders were raised to important offices. The old seat of the S. lies in the portion of Epirus which the Berlin Congress of 1878 recommended to be restored to Greece—a recommendation not carried out at the rectification of the Greek frontier 1881.—See Perrhaebos's *History of Suli and Parga* (1815; trans. 1823).

SULK, v. *sŭlk* [AS. *solcen*, sulky, remiss]: to be in a sullen humor; to be silently sullen. SULK'ING, imp. SULKED, pp. *sŭlkt.* SULKY, a. *sŭl'kĭ*, fitfully sullen; sour in temper; morose: N. a two-wheeled carriage for a single person. SUL'KILY, ad. *-lĭ.* SUL'KINESS, n. *-nĕs*, the state or quality of being sulky; sullenness. SULKS, n. plu. *sŭlks*, a fit of sullenness and discontent. TO BE IN THE SULKS, to be discontented and sullen.

SULLA *sŭl'la*, LUCIUS CORNELIUS (surnamed by himself FELIX): foremost Roman after the younger Scipio until the appearance of Julius Cæsar: B.C. 138—B.C. 78; of a family of the Cornelian *gens* or 'clan.' B.C. 107 he was elected quæstor, and sent to Africa with the cavalry that the consul Marius (q.v.) required for the Jugurthine war. He rapidly acquired brilliant reputation as an officer, and crowned a series of important services by inducing Bocchus, Mauritanian king, to surrender Jugurtha, whom he brought in chains to the Roman camp B.C. 106. Marius was not pleased at the distinction achieved by his subordinate. In the campaigns that followed B.C. 104–101 against the Cimbri and Teutones, S.'s reputation continued to rise, though Marius was still regarded (and with justice) as the first general of the state. For several years after the destruction of the barbarians, S. lived quietly at Rome taking

no part in public affairs; but B.C. 93 he stood for the pretorship, and won it by lavish distribution of money among the people Next year, he was sent to Cilicia as propretor, to replace Ariobarzanes on the throne of Cappadocia, from which he had been driven by Mithradates. On his return to Italy B.C. 91, the long-smoldering animosity between Marius and S. was on the point of bursting forth; but the terrible *Social War* forced all Romans to postpone their quarrels until the common danger had been averted. Both Marius and Sulla commanded armies in this great struggle; but the successes of S. threw those of Marius into the shade, and the mortification of his rival was deep and bitter. B.C. 88, S. was elected consul with Q. Pompeius Rufus, and the senate conferred on him the command of the Mithradatic war. This command Marius passionately desired, and when he heard that S. had obtained it, he rushed headlong into treason and civil war. There was rioting at Rome, from which S. narrowly escaped to his legions in Campania.

Here it is to be observed that Marius and S. were not only personal rivals, but also leaders of opposite political parties. Marius, a man of humble origin (see MARIUS), was a rough, stubborn, irascible, and illiterate *plebeian*; S. a finely cultivated *patrician*, subtle and sagacious in policy, and winning in manners. In the terrible scenes that ensued, though S. showed himself by far the fiercer and more sanguinary of the two, it should not be forgotten that Marius began the contest. Allying himself with the tribune P. Sulpicius Rufus, a political adventurer in difficulties, Marius placed himself at the head of the new Italian party, on which the rights of Roman citizenship had been conferred, and hoped to force the senate to recall the appointment of S. to the command of the expedition to the East. S. finding his troops in Campania full of enthusiasm for him, resolved to lead them against the pseudo-government that had been set up at Rome. The Marian party was overthrown, and their leader wandered forth an exile. After settling affairs at Rome as well as he could S. embarked for the East B.C. 87, and was absent four years. Most of his fighting, however, was in Greece against Archelaus, ally of Mithradates, whom the latter repeatedly subsidized with men and money. Athens was stormed and plundered B.C. 86, and Archelaus was defeated with frightful slaughter at Chæroneia in the same year, and again near Orchomenos B.C. 84. S. having gathered immense plunder from the ancient and wealthy cities that he had sacked, crossed the Hellespont, crushed Fimbria, a gen. sent out by the Marian party (which, in S.'s absence, had again gained the power in Italy), forced Mithradates to sue for peace, and after extorting heavy contributions from the cities of Asia Minor, sailed for Italy and landed at Brundusium in the spring of B.C. 83. Marius had died, but his party was strong in numbers, if not in organization; yet, before the close of B.C. 82, that faction in Italy was utterly crushed. Meanwhile S.'s friends and adherents in Rome had been massacred, his estates

confiscated, and he himself declared a public enemy. In Spain, however, under the gallant and high souled Sertorius (q.v.), the Marian party held out ten years longer.

When S. found himself master of the Roman world, and virtually Roman emperor, he turned to revenge. Then followed the fearful period of the *proscriptions* B.C. 81—a 'Reign of Terror' throughout Italy, with the object of literally extirpating the Marian faction. This wholesale murder has made infamous the name of S.; but it was only partially successful; and the next generation saw that party rise to more splendid predominence than ever in the person of Julius Cæsar (q.v.), nephew of old Marius. In B.C. 81 S. procured for himself the appointment of dictator, an office which he held until B.C. 79, during which period he framed a series of laws—the 'Sullan legislation'—designed to make the senate and the aristocracy as powerful as in the times of the Punic wars, but which failed of its end.

On resigning his dictatorship, S. retired to his fine estate at Puteoli, and abandoned himself to those sensual pleasures to which he had been deeply addicted from earliest manhood. His debaucheries hastened his end. S. was one of the most brilliant captains of ancient times: some of his campaigns were like a whirlwind. In affairs he carried out the bloodiest policy with a grim humor. His soldiers idolized him, because, always successful, he allowed them to plunder at will. As a statesman his utter lack of moral vision prevented him from any work that was permanent.

SULLAGE, n. *sŭl'ĭj:* collection of filth; a drain; sewage; silt and mud deposited by water: in *foundries*, the scoria which rises to the surface of the molten metal in the ladle, and which is held back when pouring, to prevent porous and rough casting.

SULLEN, a. *sŭl'lĕn* [OF. *solain*, solitary—from L. *solus*, alone]: morose; gloomily silent and angry; cloudy; dismal; in *OE.*, dull; sorrowful. SUL'LENLY, ad. *-lĭ.* SUL'LENNESS, n. *-nĕs*, a gloomy angry silence. SULLENS, n. plu. in *OE.*, morose temper; gloominess of mind.—SYN. of 'sullen': gloomy; malignant; untractable; obstinate; dark; heavy; dull; morose; sulky; sour; ill-natured.

SULLIVAN, *sŭl'ĭ-van*, ALEXANDER: politician: b. Amherstburg, Canada, 1841; of Irish parentage. In boyhood he settled in Detroit, Mich., and there conducted a shoestore. He was collector of internal revenue in N. Mex. 1869, but was removed from office; a few months later he was made postmaster at Santa Fé, where he came into financial difficulty. He then settled in Chicago, and became reporter on the Chicago *Tribune*, and sec. to the board of public works. He has been prominent in the Clan-na-Gael, and pres. of the Irish National League of America. He was an active organizer of Irish-Amer. republican societies in the presidential canvass of 1884 and of 1888. Serious charges have been brought against him but have not been proved in the courts. He is a speaker of marked ability.

SUL'LIVAN, Sir ARTHUR SEYMOUR, MUS.D., D.C.L.: musical composer: b. London 1842, May 13; d. 1900, Nov. 22. He was educated in music at the Chapel Royal, St. James's, by private tutors, and at the Leipsic Conservatorium; produced his first composition, Shakespeare's *Tempest*, 1861; collaborated in comic operas with William S. Gilbert 1866-90; received the degree LL.D. from the University of Cambridge 1876 and D.C.L from Oxford 1879; was appointed a chevalier of the Legion of Honor 1878; knighted by Queen Victoria 1883, and given the order of the Medjidie by the sultan of Turkey 1888. He was principal of the National Training School for Music 1876-81; composed the *Te Deum* for the Prince of Wales's recovery thanksgiving; and conducted the Leeds Triennial Musical Festivals 1880, 83, 86 and 89, and the London Philharmonic concerts 1885 and 6. Sullivan's musical setting of the comic operas *H. M. S. Pinafore, The Pirates of Penzance, Patience,* and *Iolanthe,* prepared in conjunction with William S. Gilbert, achieved immense popularity on both sides of the Atlantic. His graver works include: *The Prodigal Son* (1868); *On Shore and Sea* (1871); *The Light of the World* (1873); *The Martyr of Antioch* (1880); *The Golden Legend* (1886); and his lighter ones, *Princess Ida* (1884); *The Mikado* (1885); *Ruddigore* (1887); *The Yeoman of the Guard* (1888); *The Gondoliers* (1889); and his *Ivanhoe.*

SUL'LIVAN, JAMES, LL.D.: statesman: 1744, Apr. 22—1808, Dec. 10; b. Berwick, Me.; brother of Gen. John Sullivan. Having studied law under his brother, he settled in Biddeford, Me., and was king's attorney 1770. He was member of the Massachusetts provincial congress 1775; judge of the superior court of Massachusetts 1776-82, and in the meantime (1779-80) member of the Massachusetts constitutional convention; delegate from Massachusetts in the continental congress 1784-5; member of the Massachusetts executive council and judge of probate of Suffolk co. 1787; state attorney-general 1790-1807; governor 1807, re-elected 1808. He was projector of the Middlesex canal, constructed by his son John Langdon Sullivan. He received from Harvard the degree LL.D. 1780. He wrote several works, mostly on political and legal questions; among them: *Observations on the Government of the United States* (1791); *The Altar of Baal Thrown Down, or the French Nation Defended* (1795); *Causes of the French Revolution* (1798); *History of Land-titles in Massachusetts* (1801); *Constitutional Liberty of the Press* (1801).

SUL'LIVAN, JOHN, LL.D.: soldier: 1740, Feb. 17—1795, Jan. 23; b. Berwick, Me.; son of Owen Sullivan, who was b. in Limerick, Ireland, during the siege by William III., 1691, and who d. 1796, having emigrated to America 1723. Sullivan was a lawyer at Durham, N. H., and major in the militia 1772; delegate to the continental congress, Philadelphia, 1774; brigadier in the

continental army besieging Boston 1775. After the evacuation of Boston by the royalists, Sullivan commanded the n. army on the Canadian frontier, and unsuccessfully attacked the British at Three Rivers. He made a skilful retreat to New York before a hostile force far superior in numbers, and with an army scourged with smallpox. He was then made major-general and appointed to chief command on Long Island, but yielded the post of honor to Gen. Benjamin Lincoln, his senior. With 8,000 half-armed and undisciplined troops, Sullivan and Gen. Alexander (known as Lord Stirling) for a time held at bay a British force of 23,000 on Long Island; both generals were captured, but soon exchanged. Sullivan rendered efficient service in the operations in Westchester co. On the capture of Gen. Lee, Sullivan led the right wing to join Washington on the Delaware. He distinguished himself in the battle of Princeton. While the continental army was waiting for the British to attack Philadelphia, Sullivan made a dash on the British force on Staten Island and took 100 prisoners. He commanded the right wing at the Brandywine and at Germantown. To prepare the way for an expedition into Canada, Sullivan, in command of 4,000 men, entered the cantons of the Iroquois in New York, and in one short campaign completely broke the strength of the great Indian confederation, 1779. His health having been seriously impaired by 5 years of continuous service in the field, Sullivan resigned his commission, but 1780 was delegate in the continental congress, in which he was influential in procuring a reorganization of the army. He was member of the state constitutional convention of New Hampshire 1784, president (or governor) of the state 1786-89, fededal judge for the district of New Hampshire 1789 till his death. Harvard College conferred on him the degree LL.D. 1780.

SULLIVAN, TIMOTHY DANIEL: Irish poet and journalist: b. Cork, Bantry co., 1827, May 29. He was educated in the Bantry schools and was lord mayor of Dublin 1886-7. He was connected with the land league movement, and with Parnell and 18 others was prosecuted in 1881. He sat in parliament for North Westmeath (1880-5), for Dublin (1885-92), and for West Donegal (1892-1900.) He has published: *Dunboy and Other Poems; Green Leaves; Prison Poems;* etc.

SULLIVAN'S ISLAND: at the north entrance to Charleston Harbor, South Carolina; 6 m. out from Charleston. It is separated from the mainland by a tidal channel. On this island is the well-known Fort Moultrie. The island is about 6 m. long. It is a favorite resort for sea-bathing. Steam ferry-boats, which ply regularly between the city and the island, carry over 200,000 passengers.

SULLIVANT, WILLIAM STARLING: American botanist: b. Franklinton, Ohio, 1803; d. Columbus, Ohio, 1873. He

was graduated at Yale in 1823. He published: *Catalogue of Plants in the Vicinity of Columbus* (1840); *Musci Alleghanicuses* (1845); *Icones Muscorum* (1856); and many other valuable contributions to botanical science.

SULLY, v. *sŭl'lĭ* [Dan. *söle;* Sw. *söla,* to bemire: Ger. *sühlen,* to sully]: to soil; to tarnish, as a character or reputation; to stain or darken; to dirty. SUL'LYING, imp. soiling; tarnishing. SUL'LIED, pp. *-lĭd:* ADJ. tarnished; stained.

SULLY, ALFRED: American military officer: b. Philadelphia, Pa., 1821; d. Fort Vancouver, Wash., 1879, Apr. 17. He was graduated at the United States Military Academy in 1841, and assigned to the 2d infantry, with which he took part in the Seminole war and served in the war with Mexico in 1846-7. In 1861-2 he won distinction in the battles of Fair Oaks and Malvern Hill; was promoted brigadier-general of volunteers in October, 1862. In 1863 he was given command of the Department of Dakota, and greatly distinguished himself in his campaigns against hostile Indians. At the close of the war he was brevetted major-general of volunteers, and brigadier-general United States army for gallantry during the war; and was promoted colonel of the 10th infantry in 1872.

SULLY, JAMES, LL.D.: English philosopher: b. Somerset 1842, Mar. 3. He was educated in the Independent College at Taunton and in Regent's Park College, London. He afterward studied at the universities of Göttingen and Berlin, and in 1871 began to contribute to newspapers and reviews. Since 1892 he has been Grote professor of the philosophy of mind and logic in University College, London, and he also holds the post of lecturer on education at the College of Preceptors. He has written: *Sensation and Intuition* (1874); *Pessimism: a History and a Criticism* (1877), containing acute criticism of Schopenhauer and Von Hartmann; *Illusions* (1881), in the International Scientific Series; *Outlines of Psychology,* with especial reference to the theory of education (1884); *The Teacher's Handbook of Psychology* (1866), based upon the preceding work; *The Human Mind* (1892); *Studies of Childhood* (1895); *Children's Ways* (1897); and *An Essay on Laughter* (1902).

SULLY, MAXIMILIEN DE BÉTHUNE: French statesman: b. Rosny, France, 1560, Dec. 13; d. Castle of Villebon, France, 1641, Dec. 22. He was educated in the Protestant (Calvinistic) faith. He distinguished himself at the battle of Ivri in 1590, where he was severely wounded, and was afterward of great assistance to the king in resisting the intrigues of the League. In 1597 he was appointed controller of finance, and by his excellent administration largely reduced taxation, and eventually paid off a state debt of 300,000,000 livres. He also received many other offices and dignities, and became adviser of the king in all his councils. His

industry was unwearied, and he did all he could to encourage agriculture, which he regarded as the mainstay of the state. In 1606 the territory of Sully-sur-Loire was erected into a duchy in his favor. After the murder of Henry IV. (1611) he retired from court and resigned most of his charges. He now occupied himself chiefly with agriculture, and rarely took part in political affairs. He was created a marshal by Richelieu in 1634. He left memoirs which have been published in English.

SULLY, THOMAS: American artist: b. England, 1783; d. Philadelphia, 1872, Nov. 5. He came to the United States with his parents, who were actors, in 1792; studied painting in Charleston, S. C., and Richmond, Va., and in 1806 removed to New York. In 1809 he went to London to complete his studies. Two years later he returned and settled in Philadelphia. His reputation as one of the leading American portrait painters is founded on numerous works, the best known of which are the full-length portraits of Dr. Benjamin Rush, Commodore Decatur, Thomas Jefferson, and Lafayette. The Boston Museum possesses his celebrated picture of *Washington Crossing the Delaware.*

SULLY-PRUDHOMME, RENÉ FRANÇOIS ARMAND: French poet: b. Paris, 1839, May 16; d. 1907, Sept. 6. He studied law, but turned entirely to letters; published his first verses *Stances et Poèmes* in 1865, and gained praise from Sainte-Beuve; and followed up his success by several volumes, grave in manner, with finished versification and subtle in thought. Pre-eminently a thinker, he attempted a poetic treatment of abstract themes in the didactic *La Justice* (1878) and *Le Bonheur* (1888). He also made a metrical rendering of Book I. of Lucretius' *De Rerum Natura,* accurate enough, but somewhat ragged (new ed., 1886); and published in prose, *Réflexions sur l'Art des Vers* (1892), and a noteworthy article on Pascal in the *Revue des Deux Mondes* (1895). In 1881 he was chosen to the Academy, and in 1882-8 his *Œuvres Complètes* appeared. Among the titles of several individual volumes are: *Les Epreuves* (1866); *Les Solitudes* (1869); *Les Destins* (1872). The chief characteristic of his verse is its philosophic, if rather melancholy, serenity. In 1901 he was awarded the Nobel Prize for literature.

SULPHANIL'IC ACID: $NH_2C_6H_4SO_3H$, para-aminobenzine sulphonic acid, a mono-basic acid formed by action of sulphuric acid on aniline at elevated temperatures. When pure it is a colorless, beautifully crystalline body, but it darkens on exposure to the light and air. Somewhat soluble in cold water, more so in hot. Used largely in the preparation of some of the most beautiful dyestuffs.

SULPHATE, n. *sŭl'fāt:* a salt formed by sulphuric acid with any base, e.g., *sulphate* of lime (see SULPHURIC ACID). SULPHATIC, a. *sŭl-făt'ĭk,* pertaining to, contain-

ing, or resembling a sulphate. SULPHYDRATE, a compound containing the radical SH. SULPHIDE, n. *sŭl'fīd*, a compound of sulphur with another elementary substance (see SULHIDES, METALLIC). SUL'PHITE, n *-fīt*, a compound of sulphurous acid with a base. SULPHATE OF SODA, *sodium sulphate* or Glauber's salts ($Na_2SO_4.10H_2O$). SULPHATE OF MAGNESIA, *magnesium sulphate* or Epsom salts ($MgSO_4.7H_2O$). SULPHATE OF AMMONIA, *ammonium sulphate* ($[NH_4]_2SO_4$), a salt of considerable commercial importance, obtained largely from the ammoniacal liquor of gasworks. SULPHATE OF LIME, *calcium sulphate* or gypsum ($CaSO_4.2H_2O$.) SULPHATE OF IRON, *ferrous sulphate* ($FeSO_4.7H_2O$), commonly known as green vitriol or copperas. SULPHATE OF COPPER, *copper sulphate* ($CuSO_4.5H_2O$), commonly known as blue vitriol or blue stone. SULPHATE OF ZINC, *zinc sulphate* or white vitriol ($ZnSO_4.7H_2O$).

SULPHIDES, *sŭl'fīdz*, METALLIC: formerly known as *Sulphurets:* combinations of sulphur with a metal. Many occur native, and form very valuable ores. They all are solid at ordinary temperatures, and, except those of potassium, sodium, calcium, strontium, barium, and magnesium, are insoluble in water; they are, moreover, conductors of electricity. Many, especially of those that occur native, exhibit brilliant and characteristic colors. The same metal may have several sulphides, and in general there is a sulphide for each oxide; though some of the sulphides have no corresponding oxides, and *vice versâ*. Most of these compounds may be fused at a heat a little above redness; and if the air be excluded, the monosulphides (those containing one atom of sulphur and one atom of metal) remain unaffected; but many of the higher sulphides, e.g., iron bisulphide (FeS_2) and tin bisulphide (SnS_2), give off an atom of sulphur, and are reduced to monosulphides. If, however, there is free admission of air or of oxygen to the heated sulphides, they all are decomposed, the sulphur becoming oxidized and passing off as sulphur dioxide (SO_2), while the metal usually remains in combination with oxygen. Some native sulphides undergo oxidation on mere exposure to the air, but the action is then generally limited to production of sulphates, unless oxidation is so rapid that the heat generated suffices to decompose the sulphate first. Nitric acid, concentrated, decomposes most sulphides, with formation of metallic oxide, sulphuric acid, sulphur, and a lower oxide of nitrogen. Nitro-muriatic acid has the same action, but more energetic.

The sulphides are prepared in various ways, of which the following are most important: (1) The monosulphides of the metals of the alkalies and alkaline earths may be obtained by decomposing their sulphates by igniting them in closed vessels with charcoal, the oxygen being removed in the form of carbon monoxide. (2) Many of the metals when heated with sulphur combine

directly with it; iron sulphide, e.g., is usually prepared in this manner. (3) Hydrated sulphide of tin, titanium, molybdenum, tungsten, vanadium, arsenic, antimony, bismuth, copper, lead, mercury, silver, gold, and platinum with its allied metals, may be obtained by passing a stream of sulphuretted hydrogen through neutral or acid solutions of their salts, when they are precipitated in an insoluble form; and the hydrated sulphides of zinc, iron, manganese, cobalt, and nickel may be prepared by double decomposition, by mixing a solution of the salt of the metal with a solution of a sulphide of one of the metals of the alkalies, e.g., potassium sulphide: thus, zinc sulphate mixed with potassium sulphide yields potassium sulphate which remains in solution, and manganese sulphide which falls as an insoluble precipitate. In many cases, the color of these hydrated sulphides is characteristic of the metal: thus, the hydrated sulphide of zinc is white; that of manganese, flesh red; those of cadmium, arsenic, and persulphide of tin are yellow; that of trisulphide of antimony is orange red; and that of the hydrated monosulphide of tin is chocolate brown. The sulphides of the distinctly basic (electro-positive) metals unite with those of the less distinctly basic (electro-negative) metals and of the non-metallic elements, forming sulphur salts, in composition analogous to the oxygen-salts.

SULPHION, n. *sŭl'-fĭ-ŏn* [formed from *sulphur*]: in *chem.*, the hypothetical acid radical (SO_4) of the sulphates.

SULPHOCYANIC ACID, *sŭl'fō-sī-ăn'ĭk* [*sulphur*, and *cyanic*]. See THIOCYANIC ACID.

SULPHOCYAN'OGEN AND THE SULPHOCYAN'IDES. See THIOCYANIC ACID.

SULPHONAL, *sŭl'fō-nal* [*sulph*(*ur*) and *al*(*cohol*)]: a crystalline compound ($C_7H_{16}S_2O_4$) formed by combination of ethyl sulphydrate ($C_2H_5.SH$) with acetone ($CH_3.CO.CH_3$) and oxidation of product thus obtained. It is a mild sedative and a slowly but progressively active hypnotic. The sleep following its administration is reported to be usually tranquil and refreshing; but sulphonal ought not to be thus used without medical advice.

SULPHOSALT, n. *sŭl'fō-sawlt* [*sulphur*, and *salt*], or SULPHOSEL, n. *sŭl'fō-sĕl* [*L. sulphur*, and F. *sel*; L. *sal*, salt]: a salt containing sulphur in place of oxygen in the acid radical.

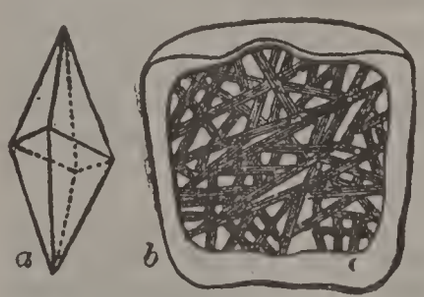
SULPHOVINIC, a. *sŭl'fō-vĭn'ĭk* [L. *sulphur*, sulphur; *vīnum*, wine]: term applied to an acid produced by action of sulphuric acid on alcohol—acid sulphate of ethyl. The formula of Sulphovinic or Ethylsulphuric Acid, or Acid Ethyl Sulphate, is $C_2H_6SO_4$. The composition is the same as that of sulphuric acid, SO_4H_2, with half the hydrogen replaced by ethyl. This compound is formed by action of sulphuric acid on alcohol. It is prepared

by mixing 1 part (weight) of strong alcohol with 2 parts concentrated sulphuric acid, heating or boiling, and then letting cool. Then the compound is diluted with water and neutralized with chalk, whereby much calcium sulphate is produced. *Calcium ethylsulphate,* a beautiful, colorless, transparent, crystalline salt, is obtained from the clear solution.

SULPHUR, n. *sŭl'fėr* [L. *sulphur,* sulphur]: one of the elementary substances, occurring in nature as a greenish-yellow, brittle, solid body, crystalline in structure, and exhaling a peculiar odor when rubbed, burning with a bluish flame, and emitting the suffocating fumes of sulphur dioxide; brimstone (see below). SULPHUR-ACID, an acid in which the oxygen is represented by sulphur. SULPHUR-ORE, the commercial term for iron pyrites, because sulphur and sulphuric acid are obtained from it. SUL'PHURY, a. *-fėr-ĭ,* having the qualities of sulphur. SUL'PHURATE, v. *-fū-rāt,* to subject to the action of sulphur: ADJ. belonging to or resembling sulphur. SUL'PHURING, n. *-fėr-ĭng,* exposure to the fumes of burning sulphur, as in bleaching. SUL'PHURA'TION, n. *-fū-rā'shŭn,* the subjection of a substance to the action of sulphur. SUL'PHURA'TOR, n. *-rā'tėr,* apparatus for fumigating or bleaching. SULPHUREOUS, a. *sŭl-fū'rĕ-ŭs,* impregnated with sulphur, as fumes. SULPHU'REOUSLY, ad. *-lĭ.* SULPHU'REOUSNESS, n. *-nĕs,* the state of being sulphureous. SULPHURET, n. *sŭl'fū-rĕt,* compound of sulphur with hydrogen, or with a metal; former term for *sulphide.* SUL'PHURET'TED, a. combined with sulphur. SULPHURIC, a. *sŭl-fū'rĭk,* pertaining to or obtained from sulphur. SULPHURIC ACID, powerful acid containing sulphur, oxygen and hydrogen (H_2SO_4), much used in the arts and in medicine, popularly called *oil of vitriol* (see below). SULPHURIC ETHER (see below). SULPHUROUS, a. *sŭl'fėr-ŭs,* containing or resembling sulphur. SULPHUROUS ACID, an acid formed and evolved in fumes from sulphur when burned in air (see SULPHUR, below). SULPHURETTED HYDROGEN, *sŭl'fū-rĕt'tĕd,* gas having the fetid odor of rotten eggs, composed of one atom of sulphur and two of hydrogen.

SUL'PHUR (symb. S., at. wt. 32, sp. gr. of rolled sulphur 1.98 [see ATOMIC WEIGHTS], and of amorphous sulphur 1.957; sp. gr. of vapor, 6.617 at 824° F., and 2.2 at 1900° F., atmospheric air being the unit of comparison for the vapor): one of the most important non-metallic elements. At ordinary temperature, it is a solid, brittle, tasteless, and inodorous body, of characteristic yellow color, and insoluble in water. A piece of solid sulphur, heated to a temperature of 239°, fuses into a thin yellow liquid; while in closed vessels it may, by further heat, be distilled, the boiling-point being about 824°, and at this temperature it yields a deep yellow vapor, of sp. gr. 6.617. When the sulphur-vapor

comes in contact with cold air it condenses in a fine yellow powder, known as *Flowers of Sulphur*. If fused sulphur be rapidly cooled, it solidifies into a compact mass, of granular crystalline texture; and if in its liquid state, it be allowed to run into cylindrical wooden molds, it is obtained in the ordinary form of roll-sulphur, or common brimstone; if, on the other hand, it be allowed to cool slowly, it crystallizes in long, glistening, deep yellow, oblique prisms, with a rhombic base, which, however, soon lose their most characteristic properties. As native sulphur is frequently seen in yellow crystals, whose form is derived from the octahedron with a rhombic base, it is obviously a dimorphous substance. It has been stated above that sulphur fuses at 239°; from that temperature up to 280°, it forms a yellow, transparent, limpid liquid; as the heat increases, the color becomes brown, and almost black, and the liquid becomes viscid, these changes being very distinct at 350°. If the external application of heat be steadily continued, for a while the temperature remains constant, but it afterward rises, and at nearly 500°, the sulphur again liquefies, though less completely than when first melted. If it be now suddenly cooled by pouring it, in a slender stream, into cold water, the sulphur assumes the form of a semi-solid transparent, elastic mass, which can be drawn out into long threads. This is known as *plastic sulphur;* its condition is an unstable one and after some hours it loses its characteristic properties, increases in density, and returns to the brittle form; or, if it be heated to 212°, it suddenly returns to the brittle condition, the temperature rising to 230° during the change. Hence, sulphur may be obtained in three (if not in more) allotropic states distinguished



native octahedral crystal of sulphur (*a*); it may be obtained artificially by dissolving sulphur in carbon bisulphide or sulphur, chloride, and submitting the solution to spontaneous evapo- by the symbols Sα, Sβ, Sγ. The first variety, Sα, is the ration. These crystals are semi-transparent, of amber-yellow color, and undergo no change on exposure to the air. The second variety, Sβ, is the oblique prismatic crystals above described as formed when fused sulphur cools slowly. The best method of obtaining these crystals is to melt a few pounds of sulphur, and allow it to solidify on the surface. On perforating the external crust with a hot wire, and pouring out the sulphur that remains liquid, the interior of the cavity is found traversed in all directions by these crystals (*b*), occurring as transparent brownish needles, having a specific gravity considerably less even

than that of roll-sulphur. On exposure to the air, they soon lose their coherence, and form an opaque and crumbling mass of minute rhombic octahedra. This conversion of the prismatic into the octahedral form takes place immediately, if the prisms are immersed in carbon bisulphide. β-sulphur appears to be trimorphous, since no less than three different types of crystals have been observed. The third variety, $S\gamma$, is the plastic amorphous sulphur, which has been described. γ-sulphur is insoluble on carbon bisulphide, but another amorphous form may be obtained which is soluble in this regard.

Sulphur is a poor conductor of heat, and the mere heat of a warm hand often causes it to crackle, and even to fall to pieces, from the unequal expansion. It is an insulator of electricity, and becomes negatively electric by friction. It is insoluble in water and alcohol: oil of turpentine and the fat oils dissolve it, but the best solvent is carbon bisulphide. When heated in the air, it takes fire at about 470°, burning with blue flame, and yielding sulphur dioxide, whose pungent suffocating fumes are characteristic of sulphur. This element is second only to oxygen in its powerful affinity for other elements, with most of which it unites, often in several proportions. In its chemical relations it bears some analogy to oxygen: to very many oxides there are correspondent sulphides; and the sulphides often unite with one another, forming compounds analogous to oxysalts. With most of the metals it combines very readily, and in some cases, with development of light and heat; thus, silver and copper burn in sulphur-vapor just as iron-wire or zinc-foil burns in oxygen. Because of its power, with the aid of heat, of forming sulphur dioxide with the oxygen of the air, thus rendering the air incapable of supporting combustion, burning sulphur may be employed for extinguishing fire—e.g., in chimneys.

Sulphur is widely distributed in the mineral kingdom, partly free and partly combined with other elements. The free sulphur is found either pure in regularly formed crystals, or intimately mixed with earthy matters. The principal supplies of crystalline sulphur are from Urbino in Italy, Girgenti in Sicily, and Radoboy in Croatia: the earthy sulphur is mainly from Italy, Moravia, and Poland. Iceland is rich in both varieties, but the mineral wealth of that island remains almost unworked. There are vast deposits of sulphur on the American continent: Mt. Purace in Colombia wears a cap of sulphur which is accumulating at the rate of 2 feet per year. A sulphur deposit near Borax Lake, Cal., is estimated to contain 20,000 tons. In 1889 sulphur was mined in Utah and Nevada; the product being, ore 1,150 tons, sulphur 450 tons, valued at $7,850. Deposits of sulphur are known to exist also in Louisiana. At present by far the greatest quantity of the sulphur of commerce comes from Sicily; and, as a general rule, it is abundant in

volcanic districts. In the form of sulphide, sulphur occurs abundantly in combination with iron, copper (iron and copper pyrites), lead (galena), zinc (blende), etc., iron bisulphide (or iron pyrites) furnishing most of the sulphur used in manufacture of sulphuric acid. Sulphur is still more extensively distributed in the form of sulphates; the sulphates of calcium, magnesium, barium, etc., being abundant natural productions. In the vegetable kingdom, sulphur is a constituent (though to only a small amount) of the albuminous bodies so widely diffused in plants; and of certain volatile irritant oils, as those of mustard, garlic, asafetida, etc.; moreover, the vegetable juices contain it in the form of certain sulphates. In the animal kingdom, it is a constituent not only of the albuminous, fibrinous, and gelatinous tissues, but also of the hair, saliva, bile, urine, etc. The two animal substances in which it is most abundant are Cystin, an occasional constituent of urinary calculi; and Taurin, a constituent of the bile; in both of which it forms about one-fourth of the entire weight.

As to the *extraction* or *preparation* of sulphur, it suffices here to state that the grosser impurities are removed by crude processes of fusion and distillation at or near the place whence it is obtained. The exported sulphur often undergoes further purification. *Refined sulphur* is that purified by distillation in a large cast-iron still, and condensed in a receiver kept cool. When the vaporized sulphur is condensed in a large chamber, it is obtained in the form of *sublimed sulphur,* or *flowers of sulphur;* but as the walls become hot, it melts and collects on the floor, and is run into cylindrical wooden molds, from which, when cool, it is taken out as *roll* or *stick sulphur.* The residue in the retort is a mixture of sulphur with various impurities. Under the names *Black Sulphur,* or *Sulphur vivum* (commonly inquired for at the chemist's under the title *Sulphur of Ivy*), it is used in veterinary medicine and for dressing moldy hops. Sulphur is thrown down from certain of its compounds (as from a strong solution of a polysulphide of calcium, sodium, or potassium) by dilute hydrochloric acid; it falls as a grayish-white, very fine, light powder, known in the Materia Medica as *milk of sulphur,* or *precipitated sulphur.* For the method of obtaining sulphur from iron pyrites, see Miller's *Inorganic Chemistry,* Wagner's *Chemical Technology,* etc. In the United States 104,950 tons of iron pyrites were mined (1889) for the sulphur contents, to be used in manufacture of sulphuric acid. The most common impurities in ordinary commercial sulphur are selenium and realgar (bisulphide of arsenic). Flowers of Sulphur frequently exhibit a slight acid reaction, in consequence of a little sulphurous acid clinging to them: rinsing them with water at once removes this impurity.

Sulphur is extensively employed in the arts and manufactures; as in the manufacture of matches, gunpowder,

etc. When converted into sulphur dioxide and sulphurous acid (SO_2 and H_2SO_3), it is used as a powerful bleaching agent, also for destruction of insects, fungi, etc.; but its chief consumption is in manufacture of sulphuric acid.

There are two compounds of sulphur and oxygen—viz.:

	Composition by Weight.	
	Sulphur.	Oxygen.
S. dioxide, or Sulphurous oxide, SO_2	32	32
S. trioxide, or Sulphuric oxide (anhydrous sulphuric acid), SO_3	32	48

Both of these unite with water and metallic oxides, or the elements thereof, producing salts; those from SO_2 are *sulphites*, those from SO_3 are *sulphates*. The composition of the hydrogen salts or acids is:

Sulphurous acid, $H_2SO_3 = H_2O$ (water) $+ SO_2$ (S. dioxide).

Sulphuric acid, $H_2SO_4 = H_2O$ (water) $+ SO_3$ (S. trioxide).

Replacement of half or all of the hydrogen by metals produces sulphites and sulphates. There are several other sulphuric acids (with corresponding metallic salts) which have no corresponding anhydrous oxides—viz.: Hyposulphurous acid, H_2SO_2, Thiosulphuric acid, $H_2S_2O_3$, Dithionic (or Hyposulphuric) acid, $H_2S_2O_6$, Trithionic, $H_2S_3O_6$, Tetrathionic, $H_2S_4O_6$, Pentathionic, $H_2S_5O_6$—all of the last four being called Polythionic acids [from Gr. *polus*, many; *theion*, sulphur]. Of all these sulphur oxides and acids, the most important is SULPHURIC ACID (q.v.). Next in importance are *Sulphur dioxide* and *Hyposulphurous acid*.

Sulphur dioxide, SO_2, commonly called *Sulphurous acid* (the hydrogen salt, H_2SO_3, bears that name in chemistry), is the only product of combustion of sulphur in dry air or in oxygen gas. It can be prepared by heating undiluted sulphuric acid (H_2SO_4) with copper clippings, whereby cupric sulphate ($CuSO_4$), water (H_2O), and S. dioxide (SO_2), are formed:

$$Cu + 2H_2SO_4 = CuSO_4 + 2H_2O + SO_2.$$

Sulphur dioxide is a colorless gas, possessing the suffocating odor of burning sulphur. In its concentrated form it is quite irrespirable, and in diluted state it excites cough, and produces the symptoms of an ordinary catarrh. It is not only incapable of burning, but it rapidly extinguishes the flame of burning bodies. It is very freely soluble in cold water, which at 32° takes up nearly 69 times its volume of the gas, while at 75° it takes up only 32 volumes; the solution, which contains hydrogen sulphite or sulphurous acid proper (H_2SO_3), quickly absorbs oxygen from the air, and is converted into sulphuric acid. By the action of cold, sulphur dioxide may be condensed to a colorless transparent limpid liquid, which freezes at —105°, forming a transparent crystalline solid. The specific gravity of the gas is 2.21 (atmos-

pheric air being the unit), and that of the liquid is 1.49, (water being the unit), the solid being considerably heavier. Dry sulphur dioxide gas and dry oxygen, when mixed, exert no action on each other; but when sulphur dioxide and water vapor are passed into a vessel cooled to about 21° F., a crystalline hydrate forms, containing about 24.2 per cent. sulphur dioxide to 75.8 water, or $H_2SO_3.10H_2O$. This gas is a common and abundant product of volcanic action, and is occasionally found in solution in the springs in volcanic regions. By reason of its solubility in water, sulphur dioxide should be collected over mercury. In addition to the uses of sulphur dioxide as a bleaching agent, it is valuable both as a disinfectant and as a powerful antiseptic: its latter property has been applied to preservation of meat, which, after exposure to this gas, will keep fresh for years, if it be inclosed in metallic canisters filled with nitrogen, to which a little dioxide of nitrogen has been added, to remove any trace of oxygen. But by far its most important use is as a first stage in the manufacture of sulphuric acid. In combination with bases, sulphur dioxide forms the *sulphites.*

Hyposulphurous acid, H_2SO_2, called also *Hydrosulphurous acid,* is formed by action of zinc on aqueous solution of sulphurous acid. The zinc merely removes an atom of oxygen, and the result is a yellow solution which has much greater decolorizing power than sulphurous acid itself, and quickly reduces salts of silver and mercury. But the solution is very unstable and quickly loses its bleaching power. A more stable product is obtained by immersing zinc clippings in concentrated solution of acid sodium sulphite, $NaHSO_3$, whereby are produced sodium hyposulphite, $NaHSO_2$, and zinc sodium sulphite, $Na_2Zn(SO_3)_2$, the latter being separable in crystals: see SODIUM.

With hydrogen, sulphur forms two compounds—viz., *Hydrogen monosulphide,* or *Sulphuretted hydrogen,* or *Hydrosulphuric Acid;* and *Persulphide of Hydrogen,* an oily liquid, having the smell and taste of sulphuretted hydrogen, and in many of its properties bearing an analogy to dioxide of hydrogen. Sulphur combines with carbon to form a *Bisulphide of Carbon* (CS_2), a very volatile colorless liquid, of high refractive power, of acrid and pungent taste, and of very disagreeable odor in its ordinary impure condition. It is heavier than water, in which it is insoluble, but dissolves freely in alcohol and ether, and is the best solvent for sulphur and phosphorus. Bisulphide of carbon does not occur as a natural product, but may be obtained by heating fragments of charcoal to bright redness in a porcelain tube, and passing sulphur vapor along it. Its vapor, when freely inhaled, exerts an anæsthetic action similar to that of chloroform and of ether. Workmen in caoutchouc or other manufactures in which bisulphide of carbon is used

as a solvent suffer much from prolonged exposure to its vapor, which produces headache, loss of appetite, impairment of vision and hearing, and general derangement of health by its deleterious action on the nervous system. Sulphur combines with chlorine in several proportions, the most important of these compounds being S. *monochloride*, SCl (or S_2Cl_2), S. *dichloride*, SCl_2, and S. *tetrachloride*, SCl_4. These all are liquids, and are formed by direct action of the combining elements. The monochloride, SCl, or S_2Cl_2, is a yellow volatile liquid with penetrating and disagreeable odor. When dropped in water, it sinks to the bottom (its sp. gr. being about 1.687), and is slowly decomposed into hydrochloric and various sulphur acids, and free sulphur. It is capable of dissolving about 67 per cent of sulphur at ordinary temperature; and like carbon bisulphide, is extensively used in vulcanizing India-rubber. S. dichloride, SCl_2, is formed by saturating the monochloride with chlorine: it is a deep-red liquid, resembling the preceding compound in most of its properties. S. tetrachloride, SCl_4, is prepared by saturating the monosulphide with chlorine at —4°.

Sulphur seems to have been known from earliest times; and sulphuric acid was probably known to the Arabians. The manufacture of sulphuric acid in England dates from the 18th c. S. dioxide was investigated first by Stahl, Scheele, and Priestley; hyposulphuric acid was discovered by Welter and Gay-Lussac; hyposulphurous acid by Gay-Lussac and Herschel; trithionic acid by Langlois; tetrathionic acid by Fordos and Gelis; and pentathionic acid by Wackenroder. Scheele was the first who accurately studied hydrogen monosulphide, or sulphuretted hydrogen.

Sulphur is used to a considerable extent and for very different purposes in medicine. It is given internally either as sublimed sulphur (flowers of sulphur) or as precipitated sulphur (milk of sulphur), in somewhat large doses, as a mild cathartic—its purgative effects being due to its stimulating the muscular coat of the intestines. Being both gentle and sure in its action, it is the best purgative in cases of piles or in stricture or other painful affections of the rectum. The only objection to its use is that, from its becoming partly converted in the system into sulphuretted hydrogen, the evacuations, and even the insensible perspiration, often become abominably fetid, and continue so for some time after the primary operation of the medicine. As a purgative, the dose is about two drams, made into an electuary with molasses or honey. It is, however, generally combined with jalap and cream of tartar.

The *Confection of Sulphur* of the Pharmacopœia is composed of sulphur, cream of tartar, and syrup of orange-peel rubbed together—the dose being half an ounce to an ounce, or one to two tablespoonfuls. In small doses, sulphur is of great value in cases of atonic gout and chronic rheumatism. An electuary known as

The Chelsea Pensioner, consisting of sublimed sulphur, 1 oz.; powdered rhubarb, 2 oz.; resin of guaiacum, 1 oz.; cream of tartar, 1 oz.; nutmeg, 1 oz., all finely powdered and made into an electuary with 1 lb. clarified honey, in doses of one or two teaspoonfuls night and morning, is a combination helpful in these cases. Dr. Neligan states that steaming the lower bowel, by sitting over the vapor of warm water upon which a tablespoonful of flowers of sulphur had been sprinkled, is a valuable remedy in what is popularly known as a 'fit of the piles.' For external use of sulphur in the form of ointment, see ITCH. It is used externally also in many other cutaneous disorders, particularly in lepra and psoriasis; and in chronic cases its application in the form of vapor is often of service.

S. dioxide in the shape of sulphur fumes, produced by burning sulphur, is much used as a disinfectant, and 'sulphur candles' are manufactured, in which the combustion of the sulphur is facilitated by combination with other materials. Fumigation with sulphur has been found to arrest the spread of the cattle-plague and other epizootics. In the U. S. *Pharmacopœia, Acidum sulphurosum* is directed to be prepared by 'treating sulphuric acid with charcoal by means of heat, receiving the acid into distilled water' (Dunglison). The use of the gas in medicine is based on its efficacy as a parisiticide and as a preventive of fermentation; hence its employment in zymotic diseases. A solution of sulphurous acid in water has a healing effect in 'primary wounds,' ulcers, burns, bed-sores, etc., also in erysipelas. Some physicians recommend inhalation of the spray of the solution or of the diluted gas in cases of croup, asthma, bronchitis, laryngeal affections, scarlatina, and typhoid. Of the *sulphites,* those of sodium, potassium, magnesium, and calcium are employed in medicine. The sulphites of sodium and of magnesium have been tried in eruptive fevers, diphtheria, typhus, typhoid, cholera, etc., with good results.

SULPHU'RIC ACID (H_2SO_4, or H_2O,SO_3): chemical name of the liquid commercially and popularly known as *Oil of Vitriol.* It received this name from having been produced first by distillation of green vitriol (sulphate of iron); Basil Valentine being usually credited with the discovery (see ALCHEMY). It is a dense, colorless, oily liquid, without smell, of sp. gr. 1.846 at a temperature of 60°, and of intensely acid taste and reaction. It has a powerful caustic action, and chars and destroys organic matters from its strong affinity for water; and, because of this destructive property, it must be handled always with greatest caution. So powerful is this affinity, that if the acid be exposed for a few days to the air in a shallow dish, so as to present a large surface, it often doubles its weight by absorbing aqueous vapor from the air; and, because of this property, it is extensively used in laboratory operations as a desiccating agent. It mixes completely with water in all proportions; and, as great

heat is given out at the moment of mixture, the dilution should be performed by very gradually adding the acid to the water. When cold, the mixture occupies less bulk than the two components previously occupied. Sulphuric acid freezes at —15°, and boils at 620°, and just above the boiling-point it assumes the form of a vapor with sp. gr. 2.15. Oil of vitriol is not the only hydrate of sulphur trioxide: three others are known. When the fuming oil of vitriol of Nordhausen is exposed to a low temperature, a white crystalline substance separates, which is a hydrate, containing half as much water as the common liquid acid. Its formula is $H_2S_2O_7$, or $H_2O(SO_3)_2$: its fusing-point is 95°. Again, a mixture of 98 parts of the strong liquid acid and 18 of water ($2H_2O.SO_3$, or $H_2SO_4.H_2O$), freezes at a temperature above 32°, and crystallizes into splendid rhombic prisms, from which property it is often termed *glacial sulphuric acid:* it boils at 435°, and its sp. gr. is 1.780. Lastly, when a very dilute acid is concentrated by evaporation *in vacuo* over oil of vitriol, the evaporation stops when the sulphur trioxide (SO_3) and water bear to each other the ratio 80 : 54, which answers to the formula $3H_2O.SO_3$, or $H_2SO_4.2H_2O$. The compound formerly known as *anhydrous sulphuric acid* (SO_3, now denominated Sulphur trioxide, or Sulphuric oxide) possesses none of the characteristic properties of an acid. See SULPHURIC ANHYDRIDE; CHEMISTRY.

Sulphuric acid in its free state is a very rare natural product, though, in combination with bases, it is common in the animal and vegetable, and abundant in the inorganic kingdom. The only cases in which it is known to occur free are those of certain American rivers, especially the Rio Vinagre in Colombia, which daily carries 37,600 kilograms—about 80,000 lbs.—of sulphuric acid, and some lakes in Tennessee, in Louisiana, and in Java; and it has been found a normal constituent of the saliva of *Dolium galia,* a species of snail found in Sicily. In all these cases, the acid is in extremely diluted form. In plants it exists in the juices; and in animals, in the blood and its derivates, chiefly in the form of sulphates of the alkalies; while in the mineral kingdom it occurs as gypsum (calcium sulphate), heavy spar (barium sulphate), celestine (strontium sulphate), etc.

Sulphuric acid may be prepared on a small scale by boiling sulphur in *aqua regia,* or in nitric acid, the sulphur becoming gradually oxidized into sulphuric acid. As a general rule, however, the commercial acid is employed even for laboratory experiments (see below).

To obtain the acid pure, suitable for medical use or medico-legal analyses, it must be redistilled with ammonium sulphate in a retort containing a few slips of platinum foil, the first and last portions being rejected. The distillation is attended with violent concussions, due partly to the high specific gravity of the acid, partly to its high boiling-point; and this convulsive action is mod-

erated mechanically by the platinum slips. Sulphuric acid thus prepared according to the directions of the Pharmacopœia may be regarded as perfectly pure, presuming arsenic is not present. Strong sulphuric acid has comparatively little action on the metals except at high temperature, when it dissolves them, and, at the same time, undergoes partial decomposition; the metal being oxidized by a portion of the acid which becomes decomposed into oxygen and sulphurous acid, and then uniting with a portion of undecomposed acid to form a sulphate. Silver, copper, mercury, arsenic, antimony, bismuth, tin, lead, and tellurium are thus acted on. Gold, platinum, rhodium, and iridium are not affected by the acid even at boiling temperature. The more oxidizable metals, such as zinc, iron, nickel, and manganese, are readily soluble in the dilute acid, hydrogen being liberated and the sulphate of the metal being formed.

The *sulphates*—or salts formed by the combination of sulphuric acid with a base—are generally composed, as in the case of green vitriol ($FeSO_4.7H_2O$, or $FeO,SO_3.7H_2O$, ferrous sulphate), of 1 equivalent of acid and 1 of metallic oxide, with or without water of crystallization. With the alkalies, this acid also forms acid salts, as potassium bisulphate; and in a few cases, e.g., copper, it forms basic salts. The insoluble sulphates, e.g., that of barium, may be obtained by precipitating a soluble salt of the base by a soluble sulphate; thus, barium nitrate and sodium sulphate yield an insoluble barium sulphate and sodium nitrate, which remains in solution. The soluble sulphates may be prepared by dissolving the oxide or carbonate in dilute sulphuric acid, in those cases in which the metal itself is not readily attacked by the acid. Sulphuric acid and the soluble sulphates are easily detected by their yielding, with a solution of a barium salt, a white precipitate of barium sulphate insoluble in acids.

This acid is employed in the arts and manufactures for numerous purposes. Its use as a desiccating agent for laboratory purposes has been noticed above; and for its application to the development of oxygen gas, see OXYGEN. But its greatest consumption, doubtless, is in the preparation of the *Salt-cake*, used in the manufacture of Carbonate of Soda (q.v.).

In medicine, two preparations of sulphuric acid are used—viz., *Diluted Sulphuric Acid* and *Aromatic Sulphuric Acid*. *Diluted Sulphuric Acid* is prepared, according to the U. S. Pharmacopœia, by adding to 2 ounces of sulphuric acid as much distilled water as will make a pint of the mixture. The dose is 10-20 drops, largely diluted. *Aromatic Sulphuric Acid* (*U. S. Pharmacopœia*) is made of sulphuric acid, 6 oz.; ginger, in coarse powder, 1 oz.; cinnamon, in coarse powder, 1½ oz.; alcohol, a sufficiency These preparations exert strong astringent power, and are serviceable in all forms of passive hemorrhages, and in checking inordinate dis-

charges arising from debility. In ordinary diarrhea, and even in the premonitory diarrhea of cholera, dilute sulphuric acid is of great use. In painters' colic, it is given in order to convert any lead that is absorbed into an insoluble sulphate, which is inert: sulphuric acid lemonade also is used as prophylactic against the disease. As this acid exerts deleterious action on the teeth, it should be taken by suction through a quill. In some cases, it is prescribed not so much for its specific as for its solvent power; with this object, it is prescribed usually with quinia. The strong acid is used in surgery as a caustic. In cases of *poisoning* with this acid, the most prominent features are: burning pain extending from the mouth to the stomach, intense pain in the bowels, vomiting, great prostration, coldness of the surface, and fetor of the breath. The mucous membrane of the parts injured by the acid is at first converted into a white slough, which soon becomes black, and the patient usually dies from exhaustion within 24 hours. The best antidotes are the alkaline bicarbonates, or carbonate of magnesia. If the primary symptoms be conquered, often the patient dies subsequently from stricture of the œsophagus.

Sulphuric Acid Manufacture.—1. *The Chamber Process*—The manufacture of sulphuric acid depends on the fact that when sulphur dioxide (SO_2), nitrogen peroxide (NO_2), and water (H_2O) are present together in certain proportions, the sulphur dioxide becomes oxidized at the expense of the nitrogen peroxide, the latter being reduced to nitric oxide by loss of half its oxygen. The material from which the requisite sulphur is obtained is generally iron pyrites. This is roasted in a series of ovens in a current of air. The sulphur burns off, leaving oxide of iron, with small quantities of silver and copper oxides: a separate operation is employed to obtain those metals. The gases from the ovens—a mixture of sulphur dioxide and atmospheric oxygen and nitrogen—are passed through pots containing oil of vitriol mixed with a little nitrate of sodium; the object of this is to provide the mixture of nitric acid and nitrogen oxides which, as has been seen, helps to oxidize the sulphur dioxide. All these gases and vapors are now conducted into the first of a series of mixing chambers made of sheet-lead. Here jets of steam are introduced at intervals, supplying the water necessary for formation of sulphuric acid. The chief reactions are seen in the following equations, of which the first represents the oxidation of the elements of sulphurous acid into sulphuric acid by the nitrogen peroxide:

$$NO_2 + SO_2 + H_2O = NO + H_2SO_4.$$

The second expresses the restoration of the oxygen to the nitric oxide by the air, which is always present:

$$NO + O = NO_2.$$

Thus a relatively small quantity of nitric oxide in presence of a continuous supply of sulphur dioxide, air, and steam, converts this mixture into sulphuric acid. Thus

produced, the acid collects in liquid form at the bottom of the chambers; and when it has reached a certain degree of concentration (60-65 per cent of sulphuric acid), the liquid is drawn off and concentrated, first by evaporation in open leaden pans, then in boilers of glass or platinum, in which weak acid distils over and is saved, leaving the concentrated acid, which is transferred to carboys, and is then ready for sale.

At the end of the series of reactions which proceed in the vitriol chambers, after condensation of the sulphuric acid, the nitrogen of the air and the greater part of the nitric oxide remain in the gaseous form. These highly noxious nitrous gases are not discharged into the atmosphere, as was formerly the custom, but are collected from the last of the leaden chambers, and taken back into the first of the series. The former operation is effected by means of a tower filled with coke on which sulphuric acid continually flows. Meeting the gases issuing from the chambers, this stream of sulphuric acid absorbs from them the oxides of nitrogen, forming a nitrosyl sulphate, which remains dissolved in excess of sulphuric acid:

$$2NO + O + 2H_2SO_4 = 2NOHSO_4 + H_2O.$$

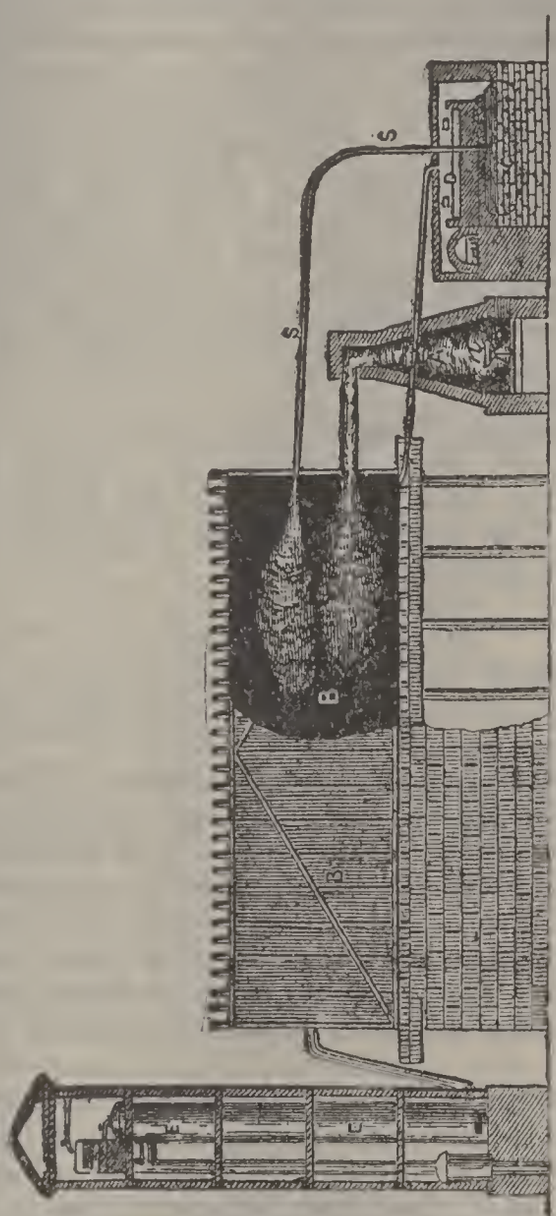
Then, in order to recover the nitric oxide from this compound, the acid solution may be decomposed by steam, but usually it is forced up to a tank at top of another tower filled with flint-stones, and communicating at the upper part with the first chamber of the series, and at the bottom connected with the flue leading from the pyrites ovens. A second tank at the top of the same tower is filled with the comparatively weak acid from the chambers. The two liquids are allowed to flow in regulated streams, so as to mix in the upper part of the column of flints. The reaction which occurs is produced by the water of the weaker acid decomposing the nitrous constituent of the stronger:

$$2NOHSO_4 + H_2O = 2H_2SO_4 + NO_2 + NO.$$

The gases thus liberated are swept back by the ascending current of hot sulphurous gas and air, and pass into the leaden chamber, while the sulphuric acid, deprived of nitrogen compounds, runs out at the bottom into the leaden evaporating pan, where the process of concentration goes on. The first tower is called the Gay-Lussac tower, the second the Glover tower—both after their inventors.

When sulphur is the material used for producing the sulphuric acid, it is burned in an oven or 'burner' of brick-work, having a sole or bottom of iron, termed the 'burner-plate.' Under this, a small fire is at first lighted, which is allowed to go out after the sulphur has ignited. A little above the sulphur, a small pot, called the nitre pot, *n*, is either placed on a stand or hung from the roof, filled with a quantity of either nitrate of sodium or nitrate of potassium, with sulphuric acid sufficient for its decomposition—8-10 lbs. nitre, with 5-6 lbs. sulphuric

acid being allowed for every 112 lbs. of sulphur. The decomposition of the nitre by action of heated sulphuric acid furnishes nitrous fumes, which go over into the chamber with the sulphur dioxide. The oxides of nitro-



Manufacture of Sulphuric Acid:
A, sulphur-burner or furnace; B, lead chamber, shown in section at B'; C, steam-boiler; D, leaden pan; E, coke tower; S, steam-pipe; *n*, nitre pot.

gen, in the presence of water, oxidize the sulphurous acid to sulphuric acid and are themselves reduced to lower forms which, in the presence of air, are converted into higher oxides, among which is nitrogen peroxide, NO_2, and these again react with sulphurous acid, so that the operation of a limited amount of nitrous fumes is continuous, acting as a carrier of oxygen to the sulphur dioxide without consumption of its own substance.

The chamber is an immense box or room of lead, bound together with a strong framework of timber, and generally raised on arches several feet above the ground. Chambers vary in size from 60 to 140 ft. in length, and from 20 to 40 ft in width and height. Curtains of lead proceeding alternately from the bottom to near the top, and *vice versâ*, are very frequently used; they serve to

retard the progress of the gases, and thus insure the transformations desired. The floor of the chamber is covered with water, into which the sulphuric acid falls as it is formed; and when this solution attains a certain strength, it is tapped off for concentration. The nitrous compounds are recovered as in the case of sulphuric acid produced from pyrites by means of a tower filled with coke, E, down which a constant stream of strong sulphuric acid trickles, the acid absorbing the nitrous fumes in their way upward. Instead of a single chamber, curtained off or not as the case may be, sometimes three or five distinct chambers, connected by pipes, are employed, those communicating directly with burners being termed working chambers, and the others receiving chambers—the last either acting as or communicating with a condenser or chimney.

2. *The Contact Process.*—Two steps are involved in this process, the direct oxidation of sulphur dioxide to sulphur trioxide, and the union of the latter substance with water. The reactions taking place may be represented by the equations:

$$SO_2 + O = SO_3.$$
$$SO_3 + H_2O = H_2SO_4.$$

To bring about the first of these reactions rapidly, a catalyzer is employed, the usual catalyzers being platinum, vanadium oxide, and iron oxide.

In the actual process purified sulphur dioxide and air are passed over asbestos covered with finely divided platinum and heated to about 660°. The sulphur trioxide formed is absorbed in dilute sulphuric acid until a concentrated acid is obtained. An excess of the trioxide leads to the formation of *fuming sulphuric acid.* The contact process, being in many ways less complex than the older process, has in a number of places supplanted the latter.

The manufacture of sulphuric acid is an extensive industry, immense quantities being consumed in manufacture of soda and of bleaching-powder, in calico-printing and dyeing, and in most chemical operations in the manufactory and the laboratory. See Lunge's *Manufacture of Sulphuric Acid and the Alkalies* (3 vols., 1879-81).

SULPHU'RIC ANHY'DRIDE: formerly known as ANHYDROUS SULPHURIC ACID (SO_3): a colorless crystalline solid, which is tough and ductile, and can be molded in the fingers like wax without injuring the skin. It liquefies at 65°, and boils at about 112°, forming a transparent vapor, if hot water be present. It unites with moisture when exposed to the air, and gives off dense white fumes. When thrown into water, the heat emitted is so great that it hisses as red-hot iron would do; and the solution has all the properties of ordinary sulphuric acid. It may be obtained by distillation of fuming Nordhausen acid, when white fumes pass over in the cooled receiver, and solidify into a white silky-looking

fibrous mass. It is also formed by the direct union of sulphur dioxide and oxygen under the influence of a catalyzer (see SULPHURIC ACID, CONTACT PROCESS). It combines with sulphur, iodine, and hydrochloric acid; but both it and its compounds are of chemical interest rather than practical value. See CHEMISTRY.

SULPHU'RIC E'THER: term commonly but improperly applied to ethylic, vinic, or ordinary Ether. True *sulphuric ether,* known also as *sulphate of ethyl* $(C_2H_5)_2SO_4$, is an oily liquid, of burning taste and ethereal odor, resembling that of peppermint, of specific gravity 1.120 (while that of ordinary pure ether is 0.720); and almost incapable of being distilled without decomposition, as at a temperature of about 280° it resolves itself into alcohol, sulphurous acid, and olefiant gas.

For the anæsthetic properties of sulphuric ether, see ETHER. Local insensibility may be readily induced by application to the skin of the finely divided spray of perfectly pure rectified ether, of specific gravity 0.723. The skin blanches in from half a minute to two minutes; and by following the knife with the spray, more than merely superficial incisions may be rendered painless. It has been successfully employed in amputations of fingers and toes, removal of tumors, opening of abscesses, removal of teeth, etc.

SULPHUR, MEDICAL USES OF: Sulphur is prepared in various ways for use, both internally and externally, in medicine. It is used in the forms of washed, precipitated, and sublimed sulphur, corresponding to the manner of its preparation from crude sulphur—by washing, precipitation, or sublimation. Sulphur is much employed as a mild laxative, taken in medicinal doses, and by its action facilitates evacuation in cases where intestinal or rectal disorders painfully interfere with it. Sulphur is also a valuable remedy in certain blood-diseases, chronic skin-diseases, chronic rheumatism, etc., both internal administration—especially in the form of mineral waters containing sulphur—and sulphur baths being often efficacious. As a parasiticide, and especially in skin affections, ringworm, itch, etc., sulphur ointment is a specific, or at least an active curative agent.

SUL'PHUROUS ACID: an acid having the formula H_2SO_3, and prepared by dissolving sulphur dioxid gas in water; the acid being formed by the union of one molecule of the dioxid with one molecule of water, according to the equation $SO_2 + H_2O = H_2SO_3$. Sulphurous acid has never been isolated, and is known only in its aqueous solution,—in combination with bases in the form of the salts known as sulphites, and as a solid hydrate. At 70° F. water dissolves about thirty-five times its own volume of sulphur dioxid; the solubility being greater at lower temperatures, and less at higher ones. When an aqueous solution of sulphurous acid is cooled below 41° F., a

crystalline hydrate of the acid separates out, the composition of which is not definitely known. Sulphurous acid readily gives off sulphur dioxid gas, and upon standing in contact with the air it gradually absorbs oxygen and becomes converted into sulphuric acid. Its composition is also modified by the action of light, probably by the formation of a more complex oxy-acid of sulphur. It acts as a weak, dibasic acid, combining with the oxides, hydrates and carbonates of many of the metals to form salts (that is, sulphites) which are readily decomposed by the addition of stronger acids, with the liberation of sulphur dioxide. When the hydrogen atoms of the acid are both replaced by a metallic base, the resulting salt is called a normal sulphite; and when only half of the hydrogen of the acid is so replaced, the salt is called an acid sulphite, or a bisulphite. Both of the sulphites of sodium are extensively used in photography; the normal sulphite having the formula Na_2SO_3, and the acid sulphite the formula $HNaSO_3$. Industrially, the bisulphites of calcium and of magnesium are of exceeding importance, since the aqueous solutions of these substances possess the power of dissolving the gummy matters by which the fibres of certain kinds of wood are cemented together. Upon this property, the sulphite process for the manufacture of wood pulp is based. In this process sulphur dioxide gas is passed through large tanks containing milk of lime (that is, calcium hydrate in suspension in water). The dioxide dissolves in the water with the formation of sulphurous acid, and this combines with the calcium hydrate according to the equation $CaO_2H_2 + H_2SO_3 = CaSO_3 + 2H_2O$. Normal calcium sulphite, $CaSO_3$ (also known as calcium monosulphite) is very insoluble, and it remains in the tank, undissolved and in a state of suspension, until all of the calcium hydrate has disappeared. If the flow of sulphur dioxide is then continued, the normal calcium sulphite absorbs it with the formation of calcium bisulphite, $Ca(HSO_3)_2$, as indicated by the equation $CaSO_3 + H_2SO_3 = Ca(HSO_3)_2$. The bisulphite of calcium is easily soluble, and (unless the original charge of lime was too great) the contents of the tank loses nearly all of its milky appearance, and becomes converted into a true solution of calcium bisulphite. The liquor so obtained is then drawn off into a strong iron receptable (or 'digester'), where it is allowed to act for some hours upon chips of spruce or poplar wood. When the action of the bisulphite is completed, the chips are found to be converted into a mere mass of disconnected fibres, which, save for such minor operations as washing and bleaching, are ready for use in the manufacture of paper. Bisulphite of magnesium also possesses the power of reducing wood chips to pulp, and in the actual conduct of the operation, paper manufacturers use a mixture of bisulphite of calcium and bisulphite of magnesium, selecting the lime that is to be

used, with special reference to the quantity of magnesia that it contains. Some manufacturers do not calcine the lime, but treat the mixed carbonates of lime and magnesia directly with sulphur dioxide gas in the presence of water; the sulphurous acid that is formed by the solution of the sulphur dioxide then attacking the carbonates directly, with the formation of the bisulphites, and the liberation of carbon dioxide For further data concerning the sulphite process for the manufacture of paper pulp from wood, consult Griffin and Little, *Chemistry of Paper Making*.

SULPHUR SPRINGS, Colo.: borough, county-seat of Grand co.; on the Grand river, near the north central part of the state, and on the D N. N. & P. railroad; about 65 miles from the Wyoming boundary line. It was settled in 1873 by W. N Byers and family, and was incorporated in 1903. It is in a high valley surrounded by mountains. The famous 'hot springs' of Grand county are here. Many tourists visit the place annually on account of the scenery, climate, and the medicinal properties of the springs. The adjacent valleys furnish pasturage for large herds of cattle The principal public buildings are the county court-house, the Congregationalist church, and the public school. There is one bank with a capital of $5,000; the annual amount of business is $250,000. The government is vested in a mayor and a council of six members, three of whom are elected each April. The borough has been incorporated since the last government census.

SULPHUR SPRINGS, Texas: city, county-seat of Hopkins co.; on the Sherman, Shreveport & Southern, and the Saint Louis Southwestern R.R.'s; about 240 miles northeast of Austin, the capital, and 75 miles northeast of Dallas. It is in an agricultural and stock-raising region and has an extensive trade in cotton products, wheat, corn, and live stock. It has two national banks with a combined capital of $200,000. The educational institutions are the Central College (M. E. S.), opened in 1876, and public schools. Pop. (1900) 3,635; (1910) 5,151.

SULPICIUS SEVERUS: Roman ecclesiastical writer: b. Aquitania 363 A.D.; d. Marseilles between 410 and 429. He was from a family of high rank, and in the practice of the law at Toulouse attained a great reputation for learning and eloquence, and led a gay though charitable life. The death of his wife led him to more serious pursuits. Having entered a monastery, he spent some years in preparing an abridgment of the scriptural narrative, which from the purity of its style was long a favorite text-book in the schools of the Middle Ages, but is liable to the charge of serious tampering with the facts, arising in part probably from the desire to rebuke in this guise some contemporary rulers. He continued

this history, describing the destruction of Jerusalem, and bringing the narrative down to his own time, under the title of *The Chronicle of Sulpicius Severus,* in which he varies materially from Josephus. His other works are: *Life of Saint Martin, Bishop of Tours; Three Dialogues;* and a collection of letters. From the elegance of his Latinity he was called, not undeservedly, 'the Christian Sallust.' His works have been often printed.

SULTAN, n. *sŭl'tăn* [Ar. *sultan,* victorious, also prince, king]: emperor of the Turks, who assumes the title Sultan of Sultans, the padisha or grand seignior: in general, a Mohammedan prince. In Turkish the title Sultan has no grammatical gender, and is applied (corresponding with Eng. *princess*) to the mother or to the daughters of the Sultan—the Eng. term being Sultana. SULTANA, n. *sŭl-tâ'nă* [It.], or SULTANESS, n. *sŭl'tă-nĕs,* mother or daughter or consort of a sultan. SULTA'NA, a. small and fine variety of raisin. SUL'TANSHIP, n. office or dignity of a sultan.

SULTE, BENJAMIN: Canadian writer: b. Three Rivers, P. Q., 1841. He took up journalism in 1860 and became editor of *Le Canada* in 1866; contributed to many periodicals. Among his works are: *Les Laurentiennes* (1870); *Histoire des Trois-Rivières* (1870); *Melanges d'Histoire et de Litterature* (1876); *Le Coin du Fen* (1877); *Chronique Trifluvienne* (1879); *Les Chants Nouveaux* (1880); *La Poèsie Francaise an Canada* (1881); *Album de l'Histoire des Trois-Rivières* (1881); *Histoire des Canadiens-Francois* (8 vols.) (1882-4); *Histoire de St. Francois-du-Lac* (1886); *Pages d'Histoire du Canada* (1891); *Causons du Pays et de la Colonization* (1891); *Radisson in the North-West 1661-3* (1905); etc.

SULTRY, a. *sŭl'trĭ* [Dut. *zwoel;* Ger. *schwül,* suffocating with heat: AS. *swelan,* to burn: OHG. *suelen,* to dry up: Icel. *svæla,* thick smoke]: oppressively hot; very hot and close. SUL'TRINESS, n. the state of being hot and close.

SULU, *sô-lô',* or JOLO, *hō-lō,* Philippines: (1) An archipelago, consisting of 188 islands, forming the southern central portion of the Philippine Archipelago, lying between the parallels 4° 30′ and 121° 52′ n. latitude, and the meridians 119° 25′ and 121° 52′ e. longitude; area, 1,029 square miles. The archipelago is surrounded by the Sulu and Mindanao seas on the north and west, and the Celebes Sea on the south and east. The islands form a long chain extending from northeast to southwest, and are divided into five principal groups: (1) Balanguingui, 19 islands; (2) Pañgutárang, 14 islands; (3) Sulu, 29 islands; (4) Tapul, 38 islands; (5) Tawi Tawi, 88 islands. The larger islands are generally high and of volcanic formation; the smaller islands are low and rest on coral; mountain chains traverse the

islands of Sulu and Tawi Tawi. The larger islands are fertile; rice, coffee, chocolate, corn, hemp, saffron, indigo, sesame, and cotton are cultivated, but not as a rule for export. The raising of horses, cattle, and goats is an important industry; there is some metal working in the manufacture of chisels, knives, etc., and weaving for home consumption. The chief industry from the commercial standpoint is pearl and pearl shell fishing, large quantities of pearl shell especially being exported; other exports are shark's fins, beche de mer and native cordage. The trade is largely in the hands of the Chinese. The forests contain many of the most valuable woods of the East. Spain never occupied but a few towns on the coast, and the native government remained largely independent of Spanish dominion. When the islands were transferred to the United States, after the Spanish-American War, negotiations were immediately begun for establishing satisfactory relations between the United States government and the Sultan of Sulu and his datos (or chiefs). In August 1899 a treaty was signed in accordance with which the sovereignty of the United States over the whole archipelago was recognized, but the government of the Sultan and datos continued, all the rights and religion of the people to be respected. The Pop. (estimated) is about 23,000. (2) A group of islands in the central part of the Sulu Archipelago, lying between the Balanguingui group and the Tapul group; area 380 sq.m. All the staples of the archipelago are cultivated; hemp and indigo are exported; but cattle raising and fishing occupy a larger number of the inhabitants. (3) Island, the central and largest island of the Sulu group; area 333 sq.m. It is traversed from n.e. to s.w. by three nearly parallel mountain chains, between which lie fertile valleys. There are numerous small streams. The soil is fertile and is well cultivated.

SUM, n. *sŭm* [Norm. F. *summe;* F. *somme,* sum—from L. *summa,* the amount]: that which two or more numbers, quantities, or particulars form when added or placed together; the amount or whole of anything; the total; a quantity of money; the substance; an abridgment; height; completion; a problem in arithmetic: V. to collect or add into one whole, as particulars or several numbers; to bring into a small compass; to compute; to comprise; to collect into a narrow compass; to condense, as a speech; in *OE.,* in *falconry,* to have feathers full-grown. SUM'LESS, a. *-lĕs,* in *OE.,* not to be computed. SUM'MING, imp. SUMMED, pp. *sŭmd.* SUMMARY, n. *sŭm'-mĕr-ĭ,* an abstract; an abridgment: ADJ. containing the substance; reduced into a small compass; short; concise; effected by a short way or method. SUM'MARILY, ad. *-lĭ.* shortly. SUMMATION, n. *sŭm-mā'shŭn,* the act of forming a sum or total amount; an aggregate. SUMMARY

CONVICTION, in *law*, a conviction without assistance of a jury (see SUMMARY JURISDICTION). SUMMARY DILIGENCE, in *Scotch law*, issuing of an execution without the formality of an action. SUM-TOTAL, n., SUMS-TOTAL, plu., the whole amount of several totals added together. TO SUM UP, to add up; to state the chief points in an argument; to review evidence, as by a judge. SUMMING UP, a judge's charge to a jury in which he reviews the evidence.—SYN. of 'summary, a.': short; concise; compendious; succinct; cursory; prompt.

SUMACH, n. *sū'măk* [F. *sumac;* Sp. *zumaque,* sumach: Ar. *summak*], (*Rhus*): genus of small trees and shrubs, of nat. order *Anacardiaceæ;* having small inconspicuous flowers in panicles or in corymbs; a 5-parted calyx, 5 petals, springing from beneath a large orbicular disk; 5 stamens; a 1-celled germen with 3 stigmas; the fruit a small, nearly dry drupe, with bony *putamen.* The species are numerous.—VENETIAN SUMAC (*R. cotinus*), known also as Wig Sumach or Wig Tree, and, in American cultivation as the Smoke-tree, native of s. Europe and w. Asia, is often planted in western countries as an ornamental shrub. It has simple leaves, and hairy corymbs of fruit, which have a sort of resemblance to periwigs. The wood dyes yellow; and, with the addition of other substances, dyes green and brown; it is known in trade as *Young Fustic.* It is largely exported. The bark is sometimes used as substitute for Peruvian Bark. The leaves are astringent, and are used in dyeing Turkey Red. The root also is used in dyeing; and the whole plant is used in Italy for tanning, and is there called *Scotino.* The seed resembles the almond in flavor.—The very acid fruit of the ELM-LEAVED SUMACH (*R. coriaria*) —native of the countries around the Mediterranean, with pinnate leaves—has been used from the earliest times, as it still is by the Turks and Persians, as a condiment. The seeds and leaves are used medicinally, in s. Europe and in the East, as tonic and cooling. This species is extensively used for tanning, particularly in Turkey and in Spain. The leaves and twigs are used for dyeing black, the roots and fruit for dyeing red, and the bark for dyeing yellow.—Similar in properties and uses is the VIRGINIAN SUMAC or STAG-HORN SUMAC (*R. typhina*), native of almost all parts of N. America, and common in British shrubberies, which has the branches curiously crooked, and covered, when young, with soft velvety down. It has pinnate leaves, with numerous leaflets.—The SMOOTH-LEAVED SUMAC (*R. glabra*), a very similar species, also N. America, has acid leaves and fruit. This species is sometimes troublesome, overrunning ground.—Of acrid and poisonous species most important is the POISON IVY or

POISON OAK (*R. toxicodendron*) of N. America. Poison Ivy does not affect all persons injuriously. It may be readily distinguished by the variety of its three leaflets, some of which are entire, others notched, sinuate or deeply lobed, on one side or both; also by the abundant rootlets by which it is attached to trees or posts, from which the branches often stand out horizontally. Chance individuals with the leaves not irregular were formerly named *R. radicans*. The POISON-DOGWOOD, or Poison-elder (*R. venenata*), is still more dangerous to touch, and, in the case of some persons, even to approach. It produces inflammation of the skin, with pustules and itching. It is a shrub 6–18 ft. high, the stem ashy gray, the young shoots purplish, the 7–13 obovate entire leaflets with a habit of standing somewhat erect. Both of these poisonous species may be recognized further by their smooth globular pale blue or greenish white, or dun-colored berries, in loose clusters in axils of the leaves; of the poisonous species only *R. metopium* of Fla. has red berries. The poison was formerly supposed a property of the juice, but is now said to be due to myriads of a species of microbe which abounds in the juice and on the surface of the plants, and has power to thrive in human flesh, though carried from one part of the body to another by the finger-nails in scratching. Lime water, or some wash or ointment containing a mineral poison or other germicide, is used in external applications. The names Ivy, Elder, Dogwood, applied to these plants, are very misleading. The innocent Flowering Dogwood, with large white flowers (involucre), and the Virginia creeper, by some called American Ivy, with 5 radiating leaflets, belong to other families.—Of the harmless sumachs, there are the Fragrant S. (*R aromatica*), from Vt. to the w. and s., shrub, with leaves like Poison Ivy, but the flowers like catkins, appearing before the leaves; the Dwarf S. (*R. copallina*), like *R. glabra*, but downy, and the leaf-stalks with wing-margins; *R. pumilla* of N. C. and Ga., dwarf, with reclining stems; and *R. cotinoides* of Ala., with plumose pedicels like the Smoke-tree or Venetian S. (*R. cotinus*).—The boiled berries of *R. succedaneum* of Japan yield a superior wax for candles; many species are used for tanning thin leather; with precautions, a varnish, like that from the Japanese species, could be prepared from our Poison S., the juice of which and of the Poison Ivy turns black; and the bark of our common Smooth S. is a mordant for red, and has been used as a febrifuge, as also the roots of the Stag-horn Sumach.—The VARNISH S., or JAPAN VARNISH TREE (*R. vernicifera*), native of Japan and Nepaul, yields a varnish much used in Japan for lacquer-work: this varnish is the juice which flows from wounds in the tree, and becomes thick and black by exposure to the air, but is still so transparent that the finest veins of wood remain visible through it. It is sometimes mixed with coloring matters, sometimes with gold-leaf finely ground.

The name TANNERS' S. is given to *Coriaria myrtifolia*, shrub of s. Europe, of nat. order *Ochnaceæ:* the leaves are astringent, and are used for tanning, and for dyeing black.

SUMAGE, or SUMMAGE, n *sŭm'ĭj* [F. *sommier*, a pack-horse]: toll for carriage on horseback; a horse-load.

SUMATRA, *sō-mâ'tra* (called by the Arabians *Srimat* or *Srimata*, 'the happy,' whence its present name): most westerly of the Sunda Islands, and one of the largest and most important of the E. Indian archipelago; s. of the Malay Peninsula, from which it is separated by the Strait of Malacca: lat. 5° 40′ n.—5° 59′ s.; 1,047 m. long, and about 230 m. in extreme breadth; estimated 170,744 sq. m. Pop., including the adjacent isles, prob. about 5,000,000, two-thirds directly or indirectly under Netherlands rule. The Europeans number about 3,000, without the army in Atcheen (see PADANG).

Physical Features.—The Barisan Mountains traverse its entire length, varying in height from 1,550 ft. in the s.w. to 6,000 under the equator. Lofty cones, about 20 being volcanoes, rise 6,000 to more than 10,000 ft. Another series of mountains runs parallel with the Barisan, lofty plateaus of great extent linking the two at various points. On the w. coast, a few miles of low land lie between the mountains and the sea, and in some parts spurs reach the shore in beetling cliffs. Wide alluvial plains, covered with dense jungle and forest, through which the rivers flow sluggishly, forming deltas at their mouths, stretch along the n.e. coast: while the tidal action is eating into the w. coast, new ground is forming on the east.

Extensive valleys lie between the mountain chains. Several beautiful lakes are in the interior. The largest is Lake Singkarah or Samawang, in Upper Padang, 17 m. long and 6 broad; 1,167 ft. above sea-level: it discharges its waters by the Ombilin, which, flowing toward the e. coast, becomes the Indragiri.

The mountain systems are of trachyte, granite, limestone, red sandstone, and a widespread conglomerate of granitic and quartzose particles, the hollows in many places being filled with lava. Sienite, porphyry, serpentine, jasper, basalt, and tufa occur. Tertiary deposits are found in the valleys; and on parts of the coasts rich vegetable mold rests on beds of red and gray clay, or on coralline limestone. Potter's clays are found and gold is widely diffused. Coal, iron-ore, copper, sulphur, lead, silver, saltpetre, alum, naphtha, etc., abound.

Rivers.—S. has many rivers: the most important are the Tūlang-Bawang; the Mūsi, or river of Palembang; the Djambi, Indragiri, and Siak, on the e.; the Singkel, Tabū-jong, Indrapūra, Moko-Moko, Bencoolen, and Padang Gūtjie on the w. Capes and bays are numerous, and the Bay of Tapanūli is capable of containing a large fleet. A chain of islands lies parallel to S. in the Indian Sea: the most important are—Babi or Si Malu, Nias (q.v.), the Batū Islands, N. Pora, Coco Island, S. Pora, N. Pagei, and S. Pagei. S.e. lies Banca, rich in tin; producing also iron, lead, silver, copper, arsenic, and amber.

Climate.—The climate is moderately healthful, especially on the e. coast. In Tapanūli, however, are large marshes, inducing intermittent and typhoidal fevers, dysentery, and

other diseases. A slight increase of temperature occurs from Oct. to March, the minimum being in May. Except in the highlands of the interior, where it is cool, the thermometer ranges from 70° F. at sunrise to 94° at 2 P.M. The monsoons are irregular, and rain falls during all the months, though the quantity in Oct and Dec. is double that in February and June.

Flora.—S has many fine species of timber-trees—as the Djati (*Tectona grandis*), the Maris, a hard and heavy wood, ebony, iron-wood, etc. The magnificent *Dryobalanops camphora*, and other resin-producing trees, abound. Several species of fig, the *Urceola elastica*, from which caoutchouc is obtained, and the gutta-percha tree (*Isonandra gutta*), are numerous. In the villages, the Bombax or silk-cotton tree, forms a shady resting-place. The lovely *Cinnamomum cassia*, the *Melaleuca leucadendron*, which yields the medicinal cajeput oil, the satin-wood (*Chloroxylon swietenia*), the gigantic reed (*Calamus draco*), from whose ripe fruit the dragon-blood gum exudes, and a great variety of palms, form part of the botanical wealth of the island. Flowering plants and shrubs are numerous, and countless parasites garland the forest trees with flowers of every hue. The most curious of these is the *Rafflesia* (q.v.), which, clinging to the bark of large trees, spreads out the largest known flower, with a calyx 3 ft. in diameter and 9 inches deep, and capable of containing 2 gallons of fluid.

The fruits are richer in flavor than those of Java: among them are the guava, citron, orange, lemon, durian, mango, bread-fruit, cocoa-nut, pomegranate, water-melons, pineapples, and the highly-prized mangosteen, or berry of *Garcinia mangostana*. Cacao, cotton, maize, indigo, tobacco, gambier, and especially rice, millet, pepper, and coffee, are cultivated.

Fauna.—The elephant, single and double-horned rhinoceros, tiger, leopard, black bear and tiger cat, wild swine, tapirs, antelopes, deer, monkeys (including the ourang-outang), ant-eaters, many kinds of bat, etc., abound. Buffaloes, cows, goats, horses, sheep, and swine are kept by the natives. The peacock and the pheasants of S. are of rare beauty. Hippopotami and crocodiles frequent the rivers, which have many kinds of fish, including a species of salmon.

Geographical and Political Divisions.—The kingdom of Atcheen (q.v.), Acheen, or *Achin*, occupies the n.w. portion of the island (extending farther s. on the e. coast than on the w.); area, 20,000 sq. m.; pop. (1882) about 480,000. The Dutch began 1873 a tedious war for subjugation of the country, which 1878 was proclaimed a Dutch govt. It is well cultivated, and produces much pepper. Singkel, Tapanūli, and Lower Padang, administratively under the presidency of Padang (q.v.), lie in succession s.e. of Acheen. Bencoolen (q.v.) stretches along the w. coast from 101° to 104° 40′ e. long.; and the extreme s. and the e. coast, 4° 4′—5° 56′ s. lat., form the Lampong districts. N. of these is the residency of Palembang (q.v.), with the kingdom of

Djambi, ruled by a native prince under Dutch control. Farther n. are Indragiri, Kampar, and Siak, governed as Djambi. Between Siak and Acheen are many petty states.

People.—The natives are chiefly Malays who profess Mohammedanism. In appearance, manners, and customs, however, the inhabitants of Acheen and the Lampongs differ widely from those of other parts. The Acheenese are tall, well made, active, and intelligent, but cunning, proud, treacherous, and blood-thirsty. They live simply, but are slaves to opium. The Lampongers are of middle stature, well formed, of pleasant exterior, mild, but uncivilized and lazy. Caste prevails, and they follow the usages of their fathers, Mohammedanism being imperfectly known and practiced. Polygamy obtains, the wives being bought from their relatives. The houses are on posts of iron-wood, and several families live under the same roof. In other parts of S. the usual Malay type is found. The Kūbūs, in n.w. Palembang, are probably the remnant of the aborigines, a harmless race living chiefly by the chase and fishing: theft and murder are scarcely known among them; and they believe in a future spirit-life. The Battas (q.v.) or Bataks, a notable semi-savage people, live in the region s.e. of Acheen.

Trade and Produce.—The imports and exports of the independent and half-independent kingdoms cannot be ascertained. Acheen alone produces 8,000 tons of pepper annually; also exports gold, precious stones, cotton, raw silk, sapan-wood, benzoin, camphor, sulphur, betel, etc., to w. India by way of Pūlū Penang and Singapore, receiving in return manufactured goods, salt, opium, etc. On the s.w. coast, Bencoolen, the Lampongs, and Palembang, imports have annual value of about $3,750,000; exports about $4,200,000. Java has nearly half the trade, Europe and eastern countries the remainder. Imports—rice, cotton and other textile fabrics, etc.; exports—benzoin, gum elastic, resin, pepper, rattans, cotton, coffee, drugs, ivory, dye-stuffs, edible nests, wax, tobacco, bêche-de-mer, etc. The rice-culture is extensive, the w. coast producing as much as 320,000 tons a year. For the foreign market coffee is the most important crop; the yield varies from 5,500 tons to nearly twice as much. Upper Padang sends the largest quantity of coffee and rice, with much cocoa-nut oil, to market: in three years the average annual value of coffee brought to market in Padang was about $600,000.

History.—Marco Polo visited S. in the 13th c., Alvaro Talezo 1506, and Siquera 1509—the Portuguese then entering into trading relations with the natives. About 96 years later, the Dutch under Houtman reached the island; and on a second visit he was treacherously murdered at Acheen. In 1601, two ships from Zeeland, with the Netherlands commissioners, Gen. De Roi and Laurens Bikker, arrived, were favorably received by the king, obtained a full cargo, and returned with two Acheenese ambassadors. Later, the Dutch drove the Portuguese from their factory at Pūlū Tiinko, s. of Padang; and 1666

the latter place became the seat of the Netherlands power on the w. coast. In 1795 Padang was taken by the British and retained till 1819. A few years afterward Bencoolen also was given up to the Dutch, and the s. division of the island soon fell under the same rule. Various rebellions against the Netherlands dominion have since arisen, with the uniform result of extending the Dutch power toward the interior and the north. The appalling eruption of 1883 at the volcanic island of Krakatoa, between S. and Java, raised a vast sea-wave which swept destructively the s. shore of S., and raised a new line of volcanic cones in the Straits of Sunda.—See the work, *Nederlandsch Indie*, by Nijhoff; *The Malay Archipelago*, by A. R. Wallace (1869); *Australasia*, by A. R. Wallace (1880).

SUMBAWA, *sôm-bâ'wâ* or *-baw'*, or SAMBAWA, *sâm-bâ'wâ:* one of the chain of islands e. of Java, in the E. Indian archipelago, and of the Sunda group; 8° 4′—9° 2′ s. lat., and 116° 50′—119° 15′ e. long.; estimated area 5,186 sq. m.; estimated pop. (1887) 150,000. S. is now divided into the kingdoms of Sumbawa, Bima, Dompo, and Sangar, each governed by its own sovereign. The island is mountainous, but except the volcano Tambora, 9,522 ft., the elevation does not exceed 5,560. The most valuable timber-tree is the Djati (*Tectona grandis*, or Indian teak), and the tamarind is so abundant as to be little valued. Rice is extensively grown. Sapan-wood is contracted for with the chiefs or kings, by the Netherlands colonial govt.—The natives are of the Malay race, but speak three different languages. They are inoffensive and industrious—murder, robbery, and theft said to be almost unknown. Many are Mohammedan; but the mountaineers are chiefly heathen, with an idea of a supreme being. Ancient relics found in Bima indicate that they were formerly believers in Hinduism.

In 1815 an eruption of Tambora depopulated the kingdoms of Tambora and Papekat, 12,000 lives being lost, and great damage done to the whole island by the ashes. Another eruption occurred 1836, and one of Gunong Api, in Bima, 1860; but with little loss.

SUMBUL, n. *sŭm'bŏl* [Tartar word]: root of a plant brought from the East, *Euryan'gĭum sumbul*, ord. *Umbellif'ĕræ;* used in medicine as a stimulant in epilepsy, hysteria, and other diseases of the nervous system. It may be given in the form of infusion, tincture, or resin. It has a musk-like odor and an aromatic and bitter taste: see MUSK PLANT.

SUMMAR ROLL, *sŭm'mĕr:* in *Scot.*, court of session procedure, a contraction of SUMMARY ROLL.

SUM'MARY JURISDIC'TION: power granted to justices of the peace to hear and determine criminal cases without intervention of a jury. The S. J. Act was an Eng. statute of 1848 to expedite proceedings in criminal cases before justices of the peace: its provisions were extended to Ireland 1871 and to Scotland 1881. In the United States the federal constitution guarantees the right of jury trial in all criminal trials except impeachments.

SUMMARY, SUMMATION, SUMMING: see SUM.

SUMMER, n. *sŭm'mĕr* [Ger. *sommer;* Dan. *sommer;* Ice). *sumar;* Gael. *samhradh*, summer]: the warmest season of the year; one of the four seasons; that which follows the spring: V. to pass the summer; to carry through the summer. SUM'MERING, imp. SUM'MERED, pp. *-mĕrd.* INDIAN SUM'MER, in *N. Amer.*, a brief period of pleasant warm weather late in autumn. SUMMER-HOUSE, a house or apartment formed in a garden for use in summer; a residence for summer. SUMMER SOLSTICE, with reference to the northern hemisphere, that period of the year when the sun attains his most northern point, about June 22.

SUMMER, n. *sŭm'mĕr* [OF. *sommier*, a sumpter-horse, a summer—from mid. L. *salma;* L. *sagma*, a pack—from Gr. *sagma*, a pack-saddle—from *sattein*, to pack]: in *arch.*, the first stone laid over columns to form a cross-vault; the central beam of a floor; a horizontal beam or girder in the front of a building—called also Breast-summer or Brest-summer (q.v.). BRES'SOMER is the breast-summer or front beam of a house.

SUMMER DUCK, or WOOD DUCK (*Aix sponsa*): the most beautiful of our ducks, and the only one breeding in hollow trees. It prefers inland creeks and ponds, and ranges through N. America. The front, crown, and drooping crest are iridescent green and purple, with lines of white; breast dark violet brown, with triangular white spots; sides with fine undulating lines, back bronze and green; wing-coverts violet blue; tail-coverts a fine pendulous fringe; and many markings of white and black; iris and part of the bill red. The female has much brown and is but slightly crested. The S. D. has been domesticated; the eggs are in size $2\frac{1}{8} \times 1\frac{1}{2}$ in., of color and polish like old ivory. It winters, sometimes, as far n. as Virginia and (it is said) New England.—Very similar is the MANDARIN DUCK (*Dendronessa* or *Aix galericulata*), a Chinese species. Both these species have the power of perching on trees. The S. D. makes its nest in the hollow of a tree.

SUMMERFIELD, *sŭm'mĕr-fēld*, JOHN: pulpit orator: 1798, Jan. 31—1825, Jan. 13; b. Preston, England. Educated in a Moravian school, with reference to the ministry. he became dissipated, and continued so after his family removed to Dublin, but was converted 1817, and joined the Wesleyans, to which connection his father belonged. He became a preacher two years afterward, and his eloquence drew large crowds in Dublin, and also in America, to which he came with his father 1821. His eloquence was fervid, chaste, and genuine, attracting hearers of all conditions. After visiting Philadelphia and other cities, he went to France 1822 for his health, and as delegate of the Amer. Bible Soc., thence to England, returning to New York 1824, and continuing to preach so far as his ill health permitted. He was one of the founders of the Amer. Tract Soc. He died in New York. A volume of his *Sermons and Sketches of Sermons* was issued; and his biography by John Holland (1829).

SUM'MER ISLANDS: small archipelago of about 20 islets off the w. coast of Scotland, near the entrance of Loch Broom, an inlet in the n.w. of the county of Ross. The largest islet is Tanera, 2 m. long, 1 m. broad.

SUMMERS, *sŭm'mėrz,* THOMAS OSMOND, D.D., LL.D., Methodist Episc. theologian: b. Dorsetshire, England, 1812, Oct. 11; d. Nashville, Tenn., 1882, May 6. He came to this country 1830, became preacher 1834, was appointed to the Augusta circuit 1835, travelling much and preaching almost daily. In 1840, he was one of the few who organized the first Texas conference. Joining the Ala. conference 1844, he participated in forming the Meth. Episc. Church, South, assisted in editing the *Southern Christian Advocate* and a new hymnal, and subsequently was official editor of the publications of his communion and of the *Quarterly Review.* During the civil war, he engaged in pastoral work south, and in 1874 was elected prof. of systematic theol. in Vanderbilt University. His principal publications are: *A Treatise on Baptism; A Treatise on Holiness; Commentary on the Gospels and the Book of Acts; The Sunday-School Teacher; Seasons, Months, and Days; Scripture Catechism; Refutation of Thomas Paine's Writings;* revision of *Watson's Biblical and Theol. Dic.;* also, *Commentary on the Ritual of the Meth. Episc. Church, South.*

SUMMERSAULT, n. *sŭm'mėr-sawlt,* or SUM'MERSET, *-sĕt* [a corruption of F. *soubresaut,* a gambol]: other spellings of SOMERSAULT and SOMERSET: see SOMERSAULT.

SUMMIST, n. *sŭm'ĭst* [eccles. L. *summista*]: one who forms an abridgment or summary; summarist. In *chh. hist.,* name given to the scholastic divines of the Middle ages, who propounded their dogmas in works called *Summæ Theologiæ:* the leaders among these were Alexander of Hales (q.v.), Albert, Count of Böllstadt (q.v.), and Thomas Aquinas (see AQUINAS, THOMAS).

SUMMIT, n. *sŭm'mĭt* [F. *sommet,* a summit—from L. *summus,* highest, topmost]: the highest point; highest degree; the top; utmost elevation. SUM'MITLESS, a. *-lĕs,* having no top.

SUM'MIT, N. J.: city in Union co.; on the Delaware, Lackawanna & Western and Rahway Valley R.R's.; 20 m. w. of New York and 12 m. w. of Newark. It is in an elevated part of the county, about 450 ft. above tide water. Summit was settled in 1795, and the first school was built the same year. The first church building was erected in 1840. It was incorporated as a township in 1869 and as a city in 1899. It is in an agricultural region, noted for its beautiful scenery and delightful climate. The chief industries which contribute to the prosperity of the city are manufacturing silk goods, cultivation of roses, farming, and the cultivation of fruit. Summit is a residential city, and has many New York

and Newark business men among its inhabitants. The municipal improvements include gas and electric lights, pure water, an excellent sewerage system, well organized police and fire departments, free postal delivery, and telegraph and telephone service. There are six churches, Y. M. C. A. building, a Fresh-Air and Convalescent Home, and the Arthur Home for Boys. The educational institutions are Kent Place School, for girls; Summit Academy, for boys; two public schools, one parish school, and a free public library. The two banks have a combined capital of $78,000. The government is vested in a mayor and a council of seven members, who hold office for three years. Pop. (1910) 7,500.

SUMMON, v. *sŭm'mŭn* [OF. *somoner;* F. *semondre,* to invite, to warn; *semonneur,* a summoner—from L. *summonērĕ,* to remind, to give a hint—from *sub,* under; *monēŏ,* I warn]: to call by authority to appear at a place specified; to give notice to appear in court; to cite; to excite, with *up,* as to *summon up* courage. SUM'MONED, pp. *-mŭnd.* SUM'MONER, n. *-mŭn-ėr,* one who summons. SUM'MONS, n. *-mŭnz* [F. *semonce,* a warning, citation]: a call by authority to appear at some particular place or in a court; the written or printed document by which such call is given; a call or invitation to surrender.—SYN. of 'summon': to call; cite; notify; convoke; convene; invite; bid; excite.

SUM'MONS: in law, an admonition to appear in court, addressed to the defendant in a personal action. It is the writ by which a personal action is always commenced. According to English law it need not state the form or cause of action, but it must contain the names of all the defendants, and must have indorsed upon it the name and address of the person taking it out, whether the plaintiff himself or his attorney. It is the duty of the person taking out a summons to serve it on the defendant in person; but if the judge is satisfied that reasonable efforts have been made to do this, and that the defendant knows that the summons has been issued against him, he may authorize the plaintiff to go on with the action without personal service.

SUMNER, CHARLES: American statesman: b. Boston 1811, Jan. 6; d. Washington, D. C., 1874, Mar. 11. His grandfather was an officer in the Continental army and his father was a lawyer and the sheriff of Suffolk county. He himself was educated in the public schools of Boston and the next year became the reporter of Judge Story's as his profession, he was admitted to the bar in 1834, and the next year became the reporter of Judge Story's decisions. After some years of practice, in December 1837 he visited Europe, where he remained for more than two years, traveling on the Continent, becoming acquainted with many distinguished men, and spending much time in England, where he made many friendships

which were of great value to him and to his country during the Civil War.

His entrance into public life was made on July 4, 1845, when he delivered in Boston the oration against war which was published under the title *The True Grandeur of Nations.* In November 1845 he made his first political speech at a meeting held to oppose the admission of Texas as a slave state, and he was conspicuous among the opponents of the Mexican War.

In September 1846 at the Whig Convention in Massachusetts he made a speech in which he took the position that the Whigs should 'express themselves openly, distinctly and solemnly against slavery—not only against its further extension but against its longer continuance under the Constitution and laws of the Union,' and urged that 'Emancipation should always be presented as the cardinal object of our national policy.' This gave him a recognized position as a leader among the anti-slavery men of Massachusetts and thenceforward he never wavered. During the years 1846 and 1847 he spoke and wrote in opposition to slavery and the Mexican War, and at the Massachusetts Whig convention in the latter year announced that he and many others would never 'support any candidate for presidency or vice-presidency who is not known to be against the extension of slavery even though he have received the sacramental unction of a "regular nomination."'

When Taylor was nominated by the Whigs on a platform which ignored the issue of slavery, he and his associates at once made their declaration good, and Sumner was active in the nomination of Van Buren. Sumner opposed the repeal of the Missouri Compromise, increasing by his speeches the sectional bitterness that existed on the subject of slavery.

The Thirty-fourth Congress met on Dec. 3 1855, and was at once confronted by the situation in Kansas, where the attempt to force a pro-slavery government upon the people of Kansas had created a dangerous situation. Sumner naturally espoused the cause of the free settlers, and in 1856 May presented the facts with great clearness and arraigned the men who were responsible for the 'crime against Kansas' with conspicuous severity in a carefully prepared speech in which he attacked Stephen A. Douglas and Senator Butler of South Carolina with sharp personalities. A bitter debate followed which left on both sides a feeling of deep exasperation. On May 22, after the Senate adjourned, Preston S. Brooks, a representative from South Carolina, attacked Sumner while he was writing at his desk and beat him over the head with a heavy cane until he fell senseless. This outrage was applauded all over the South and excited intense feeling against slavery throughout the North. So far as Sumner was concerned the consequences of the assault were serious and lasting. He was obliged to

retire from all active participation in public affairs, and though he was enthusiastically re-elected to the Senate and took the oath for the second time 1857 March 4, he immediately sailed for Europe and remained abroad, after one return to the U. S., until 1809 Nov. He took little part in the debates until June, when he delivered an elaborate oration on the 'Barbarism of Slavery,' in which he portrayed its nature and its results with unsparing severity. It was the last speech in Congress on the slavery question before the election of Lincoln. The next session was spent in attempts to prevent secession, but to all proposals of compromise Sumner was absolutely opposed because he would not tolerate any concession to disunion or slavery.

During the Civil War he was one of the most influential men in the Senate, and was at all times a persistent and consistent advocate of every measure that would abolish slavery. As chairman of the Senate committee on foreign relations he rendered equally valuable service in the conduct of our foreign affairs during the war. When Mason and Slidell were taken from the British mail steamer *Trent* in 1861 Nov. and war with England seemed probable, Sumner urged the administration to surrender the prisoners, and by letters to Cobden, Bright and others in England sought to prevent any hostile action by that country. After the surrender had been made, he gave much of his energy towards allaying the irritation both in the northern states and in England.

When the death of Lincoln brought Andrew Johnson into power, Sumner expected much of him, but when he found that Johnson proposed to restore the southern states to the Union under their former leaders, he took his stand in opposition. At first he found little support even among the Republican leaders, but as the consequences of Johnson's policy became apparent, they gradually accepted his views. He led in the contest with the president which followed the vetoes of the Freedmen's Bureau and Civil Rights bills. It was his influence, more than that of any one man, which persuaded a majority of the Republican senators to decide that no seceding state should be admitted to the Union unless its constitution guaranteed equal political rights to white and colored citizens. When President Johnson's intemperate speeches, his apparent purpose to carry out his policy at any cost, and his attempt to remove Secretary Stanton led to his impeachment, Sumner took strong ground in favor of conviction.

His opposition to the plans and policies of President Grant was considered by the latter as a personal matter, and he used his high position to show his resentment, removing Sumner's friends from the national offices, and even compassing the removal of Sumner himself from the chairmanship of the committee on foreign relations.

At the session of congress which began in 1871, Dec.,

Sumner began a contest to secure by law to the colored race absolute equality of civil rights, which he pressed with all his power until his death. The attitude of the administration on various questions, the nepotism attributed to General Grant, and certain scandals which had been exposed, brought Sumner more and more into opposition, and when the Democratic party nominated Horace Greeley for president in 1872, Sumner decided to support him. His health was now failing so that he took no part in the campaign, and though he took his seat in the senate in 1872, Dec., he was at his own request excused from service on committees and after Dec. 18 took no part in the business of the session. From that time on he suffered from attacks of angina pectoris, but while his strength permitted he continued to press the civil rights bill, until a final attack of his malady resulted in his death.

SUM'NER, Edwin Vose: 1797, Jan. 30—1863, Mar. 31; b. Boston: military officer. He received an academical education; entered the U. S. army as 2d lieutenant of infantry 1819; served in the Black Hawk war; was promoted captain 2d dragoons 1833; on duty in the Indian country several years; and became superintendent of the school for cavalry practice 1838. In 1846 he was promoted major; and 1847 led the cavalry charge at Cerro Gordo, commanded the reserves at Contreras and Churubusco, and with his cavalry checked 5,000 Mexican lancers at Molino del Rey. He was governor of New Mexico 1851-53; studied European cavalry 1853-55; promoted colonel 1st cavalry 1855; and commanded the department of the west 1858. In 1861, Mar., he was promoted brigadier-general; in the Virginia peninsular campaign 1862 commanded the 1st corps, Army of the Potomac, and was twice wounded; 1862, July, was made major-general volunteers, and commanded the 2d corps and one of the grand divisions at Fredericksburg; and died while about to take command of the department of the Missouri.

SUMNER, George Watson: American naval officer: b. Michigan 1841, Dec. 31. He was appointed to the nevy in 1858. In the civil war he participated in the bombardment of Forts Jackson and Saint Philip; commanded the *Massosoit* on the James river, and with the *Onondaga,* forced the Confederate ironclads to relinquish the purpose of attacking Grant's transports and base of supplies at City Point, Va. After the war he served in various capacities, was commandant of the Naval Station, Port Royal, S. C., in 1899-1901; commandant of the Philadelphia Navy Yard, 1901-2; commander-in-chief of the South Atlantic Squadron, 1902-3; and was retired, 1903, Dec. 31.

SUMNER, Increase: American statesman: b. Massachusetts 1746; d. 1799. He graduated at Harvard College in 1767; admitted to the bar in 1770, and in 1779 was a

member of the State Constitutional Convention. He was elected to Congress in 1782, was a member of the United States Constitutional Convention in 1789, and in 1797 was elected governor of Massachusetts.

SUM'NER, JOHN BIRD, D.D.: archbishop of Canterbury: 1780-1862, Sept. 6; b. Kenilworth, England. He studied at Eton and Cambridge; was canon of Durham 1820, and bishop of Chester 1828; and archbishop of Canterbury 1848. He was efficient in promoting schools and churches, and was the leader of the low-church section of the establishment, especially during the controversies on ritualism and the higher criticism. Among his writings were: *Apostolical Preaching* (1815); *The Records of the Creation*—prize essay (1816); *Evidences of Christianity* (1824); *Practical Reflections*—a book of selections (1859). He was eminent for piety and intellectual force, and was an accomplished writer.

SUM'NER, WILLIAM GRAHAM: author and Yale professor of political economy: b. Paterson, N. J., 1840, Oct. 30. After graduation at Yale, and several years of study at Göttingen and Oxford, he returned to be tutor 1866. He was ordained deacon in the Protestant Episcopal Church 1867, and assisted in Calvary Church, New York. From 1872 he was professor of political economy and social science at Yale. In finance, he advocated the gold standard. Of the two general schools of economics, he belonged to that which teaches the potency of natural laws and distrusts governmental interference, and, as a consequence, he was an advocate of free trade—treating that topic with wide research and great cogency of argument. Among his publications are: *History of Amer. Currency* (1874); *Lectures on the Hist. of Protection in the United States* (1875); *Life of Andrew Jackson* (1882); *What the Social Classes Owe to Each Other* (1883); *Economic Problems* (1884); *Essays on Polit. Science* (1885); *Protectionism* (1885); *Alexander Hamilton* (1890), in the 'Makers of America' series of biographies; *The Financier and the Finances of the Amer. Revolution*, 2 vols. (1891); *Robert Morris* (1893); *History of Banking in U. S.* (1896); *Folkways* (1907); etc.

SUMP, n. *sŭmp* [Dan. and Sw. *sump;* Dut. *somp;* Ger. *sumpf*, a swamp, a marsh]: an excavation at the bottom of a mine where the water accumulates, and from which it is pumped; a round pit of stone lined with clay for receiving metal on its first fusion; in *salt-works*, the pond into which the sea-water is pumped for future use.

SUMPTER, n. *sŭm'tĕr* [F. *sommier;* It. *somaro*, a pack-horse—from L. *sagma;* Gr. *sagma*, the load of a beast—from *sattein*, to pack]: an animal which carries baggage; a baggage horse or mule; used as the first part of a compound, as *sumpter*-horse.

SUMPTUARY, a. *sŭm'tū-ĕr-ĭ* [L. *sumptŭārĭus*, of or relating to expense—from *sumptus*, expense, cost; *sa-*

mĕrĕ, to spend: F. *somptuaire*, sumptuary]: relating to expense; regulating the cost of living. SUMP'TUOUS, a. *-ŭs* [F. *somptueux;* L. *sumptŭōsus*]: costly; expensive; magnificent; splendid; princely. SUMP'TUOUSLY, ad. *-lĭ*. SUMP'TUOUSNESS, n. *-nĕs*, the state of being sumptuous; costliness; expensiveness.

SUMP'TUARY LAWS: a term often used in American political discussion with reference to laws regulating the sale of liquor. The original meaning, however, was the regulation by law of eating and drinking, wearing apparel, and style of living generally. The early settlers of New England adopted harsh laws of this character, which have been exaggerated and caricatured in the fictitious Connecticut 'Blue Laws' of the Rev. Samuel A. Peters.

Sumptuary laws existed in ancient as well as modern times. One of the Roman laws of the Twelve Tables aimed at repressing extravagance in funerals. After the establishment of the censorship those holding this office had the right of punishing those guilty of luxurious living. After the Twelve Tables the first sumptuary law passed at Rome was the Lex Oppia (215 B.C.), directed exclusively against the extravagance of women in dress, jewelry, etc. This law was repealed 20 years later. The other sumptuary laws enacted at Rome were almost exclusively designed to keep down extravagance in entertainments. The Lex Julia, passed in the reign of Augustus, was the last sumptuary law passed at Rome, but a few endeavors were made under later emperors also to repress luxury by decrees of the senate and imperial edicts. The last attempt of this nature that is known to have been made belongs to the reign of Nero. Sumptuary laws were revived by Charlemagne. Both he and Louis the Débonnaire promulgated capitularies against luxury in dress and furniture. Various other laws and decrees having a like object were made under many of the later kings of France, even down to Louis XV. A royal ordinance, dated 1737, Apr. 19, forbids the common people (*vilains*) the use of calico, which was reserved for the nobility, and there are instances of the wives of commoners being fined in virtue of this decree. In England sumptuary laws began to be enacted in the reign of Edward III., and continued to be passed down to the time of the Reformation. Most of them were repealed by 1 James I., ch. xxv., but they were not all expunged from the statute-book till 1856.

Sumptuary laws in the early colonial period of America were not confined to New England. Directions were sent to Virginia in 1621 not to permit any but members of the Council to wear gold in their clothes, 'or to wear silk till they make it themselves.' In New England the Massachusetts magistrates prohibited the wearing of gold, silver, or thread lace, all embroideries or needlework in the form of caps, bands, or rails, gold and silver

girdles, and other extravagances which offended Puritan simplicity. The laws were, however, ignored or but lightly enforced, and gradually became obsolete. At present in the United States dress is solely a question of decency, and sumptuary laws are, in that sense, of the past.

SUMTER: S. C.; city, county-seat of Sumter co.; on the main line and several branches of the Atlantic Coast Line railroad; 80 m. n. of Charleston. It is in an agricultural region producing cotton, tobacco, and vegetables, of which it exports large quantities. It also has manufacturing interests of importance; the census of 1900 reported 52 manufacturing establishments with a capital of $308,272; these include cotton factories, planing mills, sash and blind factories, etc. There is a national bank with a capital of $75,000, and a state bank. The city has a public high school founded in 1889, and is the seat of Saint Joseph's Academy, a Roman Catholic school for girls, and of the Sumter Military Academy and Female Seminary, a co-educational non-sectarian school. Pop. (1890) 3,865; (1900) 5,673; (1910) 8,109.

SUMTER, FORT. See FORT SUMTER.

SUMTER, *sŭm'tėr,* THOMAS: 1734-1832, June 1; b. Virginia: military officer in the revolution. He removed to South Carolina early in life; took part in the Cherokee war; was appointed lieutenant-colonel 2d South Carolina riflemen 1776, Mar.; soon afterward was promoted colonel; and served in the n. part of South Carolina till after the fall of Charleston, 1780, May. He then determined to wage a partisan warfare against the British; collected a force of refugees in North Carolina; surprised and cut to pieces a company of mounted infantry 1780, July 12; unsuccessfully attacked the British post at Rocky Mount Aug. 1; defeated and routed the Prince of Wales regiment at Hanging Rock Aug. 6; captured a valuable convoy Aug. 16; and was routed by Tarleton, Aug. 18. In Nov. he gained a victory at Broad river and defeated Tarleton at Blackstocks, and 1781, Jan., received thanks of congress for his services. He cooperated with Marion, Pickens, and other leaders till the close of the war. Congress and South Carolina gave this brave and energetic soldier the well-earned commission of brigadier-general. He was a member of the federal constitutional convention; member of congress 1789-93 and 1797-1802; U. S. senator 1801-09; and U. S. minister to Brazil 1809-11.

SUMY, *sô'mē:* Russia; a town in the government of Kharkov, on the river Psiol, 83 m. n. of the town of Kharkov. It has nine churches, a gymnasium, technical school, banks, and a large sugar refinery, besides numerous distilleries. The soil is productive, and agricultural products are exported together with brandy. Four annual fairs give considerable impulse to trade. Pop. (1897) 26,662.

SUN, THE: great luminary which is the centre of our planetary system, and on which depends all life on our globe. From the earliest ages it has drawn the wonder and admiration of men, and its worship was probably the very first form of idolatry: see SUN-WORSHIP.

When the true system of the universe became known, one of the first labors of astronomers was to ascertain the distance and size of the sun, and these have been known for some time with an approach to accuracy; but until lately, the most vague theories regarding its chemical and physical constitution have prevailed. Within the last few years, however, knowledge of its chemical and physical constitution has increased with a rapidity probably unequalled in any other branch of science.

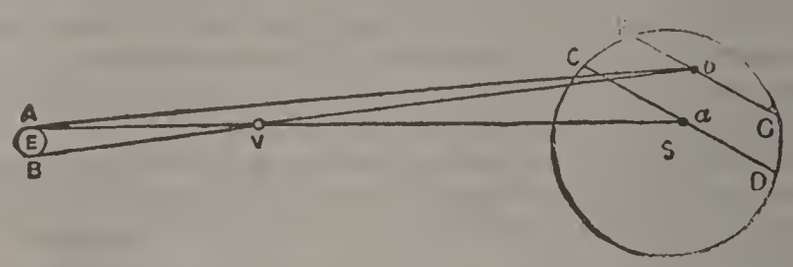
Our knowledge regarding the sun is here arranged under three heads: *the general relations of the sun to our globe; the sun's chemical constitution;* and *the sun's physical constitution.*

Distance of the Sun from the Earth.—The difficulty in ascertaining the Parallax (q.v.) of the sun arises from the smallness of the base line as compared with the distance of the object. The distance of the observing stations must always be less than 8,000 m.; from this the parallax of the moon, which is only 30 times 8,000, can be observed directly with approximate correctness. But when the distance is many thousand times the length of the base line, the triangle is 'ill-conditioned' or unfavorable to accuracy, and the problem must be approached indirectly. The first attempt to measure the distance of the sun was by the Greek astronomer Aristarchus, B.C. 3d c., who made it only about one-twentieth of what we now know it to be. Even the great astronomer Kepler in the 17th c. could say only that the distance must be at least between 13 and 14 millions of miles. From transits of Venus, 91,500,000 m. came to be accepted as the approximate distance of the sun until the transit of 1874, which had for its successor that of 1882: there will not be another until 2004, June 8.

The way in which a transit is turned to account may be understood from the accompanying diagram, where E represents the earth; V, Venus; S, the sun. It is to be premised that the *relative* distances of the planets from the sun are well known. Their periodic times can be observed with accuracy, and from these, by Kepler's (q.v.) Law, we can deduce the *proportions* of the distances, but not the distances themselves. It is thus known that if the distance of the earth from the sun is taken as 100, that of Venus is 72. In the fig., then, AV is 28, about one-third of V*a* or V*b*.

An observer at a station, A, on the northern part of the earth will see the planet projected on the sun as at *a*, while a southern observer will see it at *b*. The distance of the sun from Venus being about three times her distance from the earth, it is obvious that the distance *ab* will be three times the distance AB; and it is a great advantage to have the stations A, B, as far apart as possible, as the interval *ab* is thus increased and its measurement rendered more accurate.

But how is it measured? For each observer sees only one of the spots, and does not know where the other is; and there are no permanent marks on the sun's surface to guide us. The difficulty is overcome in the following way: Each observer notes the exact duration of the transit, that is, the time that the spot takes to travel from C to D, or from F to G. Now as we know the rate of Venus's motion in her orbit, this gives us the lengths of the lines CD and FG in minutes and seconds of arc. Knowing



then the angular diameter of the sun (32′) and the lengths of two chords CD and FG, we can easily, by the properties of the circle, find the distance *ab* between them. This gives us the angle *a*A*b*. In the triangle AV*b*, then, we know the angle at A and the proportion of the sides AV and V*b*, and from that we can find the angle A*b*V or A*b*B. Now this is the quantity sought, being the parallax of the sun as seen from two stations on the earth. Whatever the distance AB actually is, the angle is reduced to correspond to a distance equal to the earth's semi-diameter.

The first partial discussion of the British observations 1874 gave, according to the astronomer royal, a result of $93\frac{4}{10}$ millions of m. A more extended discussion afterward announced results in $92\frac{5}{10}$ millions of m. At the Brit. Assoc., 1883, Mr. Ball stated the sun's distance at 92,700,000 m.—a total which cannot probably be more than 300,000 m. wrong.

Astronomers, however, are turning with greater hope to other methods, especially to observations of Mars, and of some of the minor planets. From observations of Mars, 1862, the Amer. astronomer Newcomb deduced a distance of $92\frac{2}{10}$ millions of m. Mr. Gill's observations on Mars 1877 were made by means of the heliometer, the most effective of instruments for such purposes. From such of his observations as had been reduced Mr. Gill announced his belief that the sun's distance will prove to be nearer 93 than 92 millions of miles.

The other important numerical facts relative to the sun are the following: Its *diameter*, calculated on the basis of the shorter distance hitherto received, is, in round numbers, 866,500 m., or more than $109\frac{1}{2}$ times the mean diameter of the earth; so that the *volume* or bulk of the sun exceeds that of the earth 1,300,000 times, and is 600 times greater than the bulk of all known planets together. The *mass* of the sun, or quantity of matter that it contains as measured by weight, exceeds that of the earth only 330,000 times; thus it appears that the matter of the sun has only one-fourth the density of that of the earth, and

but $1\frac{1}{2}$ times that of water. From this and other facts, it is inferred that the matter of the sun exists for the most part in gaseous condition. Still his mass is between 700 and 800 times greater than the masses of all known planets together. The *period of rotation* of the sun on its axis, which Galileo was the first to calculate from observations of the sun spots, and which takes place in the same direction as that of the earth, is about 25 days at the sun's equator, and 27 at latitude 40°, owing to drift of the photosphere. The *inclination* of the axis of the sun to the ecliptic is about $7\frac{1}{2}°$, and the *longitude of the ascending node* is about 74° 30′.

Chemical Constitution of the Sun.—Astronomy weighed and measured the sun long ago, and in our days, chemistry aided by physics, makes an analysis of it: see SPECTRUM The main fact on which the method rests is briefly this that a substance, when comparatively cold, absorbs the very same rays which it gives out when heated. Hence it was inferred by Kirchhoff, that if there were sodium or iron in a comparatively cold state in the solar atmosphere, above the source of light, these substances would produce black lines corresponding in spectral position with the bright lines which they give out when heated. On this principle the following elements are identified in the solar spectrum: iron, titanium, calcium, manganese, nickel, cobalt, chromium, barium, sodium, magnesium, copper (?), hydrogen, paliadium, vanadium, molybdenum, strontium, lead, uranium, aluminium, cerium, cadmium, oxygen, and probably indium, lithium, rubidium, iridium, cæsium, bismuth, tin, silver, glucinum, lanthanum, yttrium, and carbon. In 1877, Prof. Henry Draper (q.v.) of N. Y., announced the discovery of oxygen. A chief source of complication in research of this kind is the possible effect on the spectra of substances produced by excessive heat, which seems to dissociate the groups of atoms forming the molecules, or produce allotropic states unknown on the earth, or even resolve some elements into components. Certain unknown spectrum lines are those attributed to hypothetical elements named helium and coronium—the latter very constant in the corona and thought to indicate something more tenuous than hydrogen. But the subject is full of unsolved riddles that cannot be stated here. The labors of Lockyer, Huggins, Janssen, Draper, and other have been directed toward overcoming these and other obstacles.

Physical Constitution of the Sun.—Astronomers are now agreed, for the most part, that the body of the sun is composed of intensely heated gases, though under such enormous pressure that they may be comparable to a viscous mass, while the great heat forbids their taking the distinctive character of liquid or solid. Outside of this body of the sun, the gases, relieved of the exceeding pressure, are condensed into the highly heated luminous vapors that form the photosphere, the vapors being any chemical elements or compounds in minute molten droplets. This brilliant shell of vapor seems made up of clouds immersed in gas

giving the sun a mottled and more or less reticulated appearance; and the clouds are apparently composed of columns of condensation, in general vertical, with enlarged tops, as discerned in the penumbra of a spot, where they bend like threads inward toward the dark umbra. The 'rice-grains' and 'willow-leaves' were mal-observations. The *faculæ* are irregular uprisings or upbursts of the photospheric clouds, as may be seen near the edge of the sun; and they abound most in the vicinity of spots. Outside of the photosphere, but also penetrating it, is the chromosphere, averaging 5,000—6,000 ft. thick, its nature and red color due to the principal component, incandescent hydrogen; it swells into domes and various forms (called prominences and protuberances), and these are of two classes: the quiescent, cloud-like, hydrogenous, resembling cirrus, stratus, cumulus, etc., usually connected with the chromosphere by stems or columns; and the eruptive or metallic, usually in the form of spikes or jets, sometimes like whirling water-spouts, and of every variety of fantastic form, often changing rapidly, their velocity upward often exceeding a hundred m. a second; the spectrum of these is very complicated, indicating many gaseous metals, and they seem outbursts from the depths of the sun, usually in the vicinity of a spot, rushing through narrow vents in the dense clouds of the photosphere, and perhaps originating in deep explosions. They rise ordinarily 20,000—30,000 miles, but sometimes equal or exceed the highest projections of the first class, one of which is recorded as 13 minutes of an arc, or 350,000 miles. Outside of the other envelopes is the mysterious corona, 'an irregular halo of faint, pearly light, composed for the most part of radial filaments and streamers, which extend outward often more than a million miles,' and change but gradually. It was supposed to be of the nature of the aurora borealis, but the spectrum line is different. There is evidence that it contains glowing gaseous matter in a somewhat regular atmosphere around the sun, 300,000 m. high, and that the streamers and intervening rifts are due to something like mist or dust that reflects light, giving a continuous spectrum; but the subject is still in doubt. The coronal streamers are most developed midway between the sun's equator and poles, those from other latitudes leaning toward these generally, and so giving the corona a tendency to appear as a vast four-rayed star. While meteoric matter probably abounds near the sun, it cannot account for the forms assumed by the corona.—The two rival theories of the sun-spots that have nearly excluded others are Faye's, that the spots are down-rushes of cooler matter, due to eddies in the drift of the photosphere (a supposition discountenanced by too much assumption in regard to the drift, and by the rarity of vorticose motion in a spot); and Secchi's latest theory, that comparatively cooled material from neighboring eruptive projections descends and by its weight depresses the photosphere locally. Prof. C. A. Young modifies this by attributing the depression to diminished upward pressure from below, in consequence of

neighboring facuæ or other eruptions. The umbra or dark portion of a spot may be some hundreds of miles deep, and is dark only by comparison with the surrounding brightness; its penumbra resembles a wall sloping toward the umbra. Single spots have measured 50,000 m. in diameter. The spots occur mostly between latitudes 10° and 30°, both n. and s.; they have never been noticed but once beyond 45°. Their duration is from a few hours to 18 months. Their periodicity of maximum and minimum numbers has been verified from observations and records extending back 150 years, but was discovered by Schwabe 1851. The mean period is $11\frac{1}{9}$ years, with average variability of 2 years, and the extreme variation of $7\frac{3}{10}$ and $16\frac{1}{10}$ years; and there is thought to be a possible superimposed fluctuation of half a century. From minimum to maximum the average is $4\frac{1}{2}$ years; from maximum to minimum, $6\frac{6}{10}$. Computing from the minimum that occurred the last of 1878, the following minimum should have been at the beginning of 1890. The cause of the periodicity cannot thus far be explained by the position of the planets; and, in the absence of any explanation, may be supposed to result from cumulative actions and reactions within the sun itself. The connection with terrestrial facts has been the subject of much discussion. There is certainly a striking coincidence with the periodical increase and decrease of magnetic oscillation; and the spots have had striking and immediate responses in magnetic storms and auroras. The evidence is thought to indicate a slight lowering of temperature on the earth in the maximum period of solar disturbance, perhaps due to the more heat-absorptive condition of the solar atmosphere, filled with products of eruption. The evidence that maximum terrestrial storms and rainfall occur at (or one year after) the spot maximum, is very conflicting. No good correspondence has been made out for cholera, nor for commercial crises, crops, famines, etc.

The intensity of the sun's light would be doubled, perhaps quadrupled, if there were no partial absorption by its own atmosphere. As it is, it is 5,300 times the brightness of molten metal at white heat. A powerful electric arc appears black when seen against the sun. The heat of the sun on the earth's surface is equal to 1 horse-power on every 30 sq. ft. (and attempts have been made to use it by large concave mirrors to drive engines); on the sun's surface, it is equal to 10,000 horse-power to each sq. ft. Calculations in thousands of degrees F. have been very conflicting. The most powerful lens ever constructed brings the sun in effect within 250,000 m. distance, and instantly melts or vaporizes fire-clay, platinum, and diamond. If a column of ice $2\frac{1}{4}$ m. in diameter extended from the earth to the sun, and the entire heat of the sun were concentrated on it, it would dissolve in one second, and be scattered in vapor in 7 seconds. It is this solar energy on which all terrestrial motion and physical life depend. 'What drives that locomotive?' said George Stephenson, and he answered himself—'The sun'—its energy having reorganized carbon in plants of the Carboniferous age, and stored itself up in

coal, to be liberated when the carbon rushes into union with oxygen. The energies of the sun, however, are not free, except as converted into heat, light, and chemical power; at the heat end of the spectrum, the two latter effects are not produced; at the 'actinic' end, the two former are not.—The cause of the sun's heat was for a while referred to a continuous storm of meteorites, the fall converted into heat; but, while this theory may have subordinate place, astronomers incline to the theory that the sun's contraction (too slow to be perceptible on earth) is the prime cause, a process of giving off heat in comparative condensation, familiar in common examples.

The contraction theory of the sun's heat was originally proposed by Helenholtz in 1854; it was afterwards applied to a gaseous body by the American astronomers J. Homer Lane, in 1869, and in 1905 Professor T. J. J. See greatly extended and perfected the gaseous theory, the sun being regarded as made up of single atoms, such as those constituting vapor of mercury, argon, helium, etc. This is called the Monatonic Theory. According to Professor See's researches we have the following important results: The annual shrinkage of the sun's radius is 216 feet; (2) one-half of the heat produced remains stored up in the sun's globe for raising the temperature; (3) the future duration of the sun's activity may be three times that of the past, and will be at least 30 million years; (4) the central density of the sun is exactly six times that of the mean density, or about 8-42 times that of water; (5) the surface layers of the sun are rarer than the earth's atmosphere, so that the heat and light are supplied by direct radiation; (6) the pressure as we go down in the sun is so great that connection currents do not descend to any appreciable depth; (7) the pressure renders the matter rigid, and the average rigidity of the sun's globe is about 2,000 times that of nickel steel; (8) the temperature near the sun's center is some 50 million degrees, though only about 6,000 degrees at the surface. Professor See's researches will be found in the *Astronomische Nochrichten*, Nos. 4053 and 4404.

It has sometimes been suggested that the sun may be in great part a mass of radium. To this view there are two seemingly insuperable objections. One is that the spectroscope shows the sun to be made up of the same substances that compose the crust of the earth, and that there is no trace of radium shown by the spectroscope. The other is that radium sends forth other rays than those commonly known as radiant energy—rays having peculiar properties and connected with radio-activity. Now, singular as it may seem, the most refined examination and tests of the sun's rays have, up to the present time, shown no trace of these radio-active emanations although, as we have shown, there is evidence that the sun does set forth some emanations distinct from its heat and light. Consult: Young, *The Sun*, a volume of

the *International Scientific Series,* and the most recent work on the subject in English; Secchi, *Le Soleil,* the most extended treatise, with atlas; Lockyer, *Solar Physics,* which treats extensively of the spectroscopy of the sun, and the conclusions to be drawn from it.

S'UNAH'SEPHA, *sô-nâ'sē-fa:* in the ancient legends of India, son of a poor Brahman who was sold by his father for 100 cows to *Haris'ehandra,* who offered him as a victim to Varun'a, instead of his own son Rohita, whom he had vowed to sacrifice to this god. The legend relates that when Sunahsepha was bound to the sacrificial post by his own father, he prayed in succession to various gods, including the Dawn; and while he was praising the Dawn, was freed from his fetters.

SUNART, LOCH, *loch sôn'ârt:* inlet of the sea in w. Argyleshire, length 19 m.

SUN'BIRDS (*Cinnyridæ*): family of birds of order *Insessores,* tribe *Tenuirostres,* which may be regarded as a connecting link between the Creepers and the Humming-birds, and as occupying nearly the same place in the tropical parts of the old world which belongs to the humming-birds in America. They are of small size, though none so small as the smallest humming-birds; they rival humming-birds in brilliancy of plumage, and like them they feed on the juices of flowers, which they suck by their long bill; they do not, however, flutter on the wing when feeding, like humming-birds, but perch on or beside the flower. The species are very numerous, and are natives of s. Asia, the E. Archipelago, and Africa. The resplendent metallic plumage belongs only to the male.

SUN-BITTERN: an extraordinary somewhat rail-like bird of Brazil and Guiana (*Eurypga helias*). It is about 16 inches long; body small and thin, neck long and slender, head like that of a heron, with a long, powerful beak compressed at the sides and slightly arched at the culmen; the plumage is minutely variegated with bars and spots of many colors, and it has the habit of spreading wings and tail in courtship, or on other occasions of excitement, forming a rosette about its head and neck fancifully compared to a 'sunburst.' It is often made a pet by the Brazilians, who call it peacock. A larger species (*E. major*) inhabits Venezuela and Colombia. Their nearest relative is the kagu.

SUNBURY: Pa.; borough, county-seat of Northumberland co.; on the Susquehanna river, and on the Pennsylvania and the Philadelphia & R. railroads; about 157 m. n. of Philadelphia and 55 m. n. of Harrisburg. It was settled in 1772, June, by Surveyor-General Lukens and William Maclay. It was incorporated as a borough 1797, Mar. 24. The place was once the site of the Indian village of Shamokin. In 1756 Fort Augusta was erected here as a means of defense against the French and Indians. The city is in a lumbering and coal region.

The chief manufacturing establishments are railroad shops, planing mills, silk mills, dye works, sash and door factories, nail factories, a rolling mill, and coffin and casket works. It is an important commercial and industrial center for a large region; extensive coal shipments are made from here. A small stream separates Sunbury and East Sunbury; the boroughs are one in industrial and commercial interests, but have independent municipal government. Pop. of Sunbury (1890) 5,930; (1900) 9,810; (1910) 13,770.

SUNDA, *sŭn'da*, ISLANDS: great chain of islands belonging to Malaysia, extending e., beginning with Sumatra and ending with Timor, and separating the Java Sea from the Indian Ocean. Sunda Strait is a passage 70 to 90 m. wide, between Sumatra and Java. A dreadful volcanic eruption (1883, Aug. 26) at the small island of Krakatoa, in the strait, did fearful damage on the shores of Sumatra and Java, and raised new volcanic islets in the strait, so that a new survey was rendered necessary.

SUN-DANCE: a ceremony performed, with local variations, by most of the prairie Indians, including the Mandan, Omaha, Pawnee Loup, Cheyenne, Arikara, Hidatsa, Blackfeet, Nez Percé, Winnebago, Yankton, Santee, and Kiowa. It is held apparently at the full moon, occurring at or next after the summer solstice, and lasts from three to six days. The budding of the wild sage also indicates the time for holding the ceremony, and all neighboring tribes, whether friendly or not, are usually invited. The dance begins at sunrise and ceases at the following sunrise. As may be inferred from the length of the festival, including the fasting and purification of the devotees and other preparatory acts, the actual sun-dance is but the chief episode in a ritual comprising a congeries of ceremonies. The motive or purpose of the dance is to promote welfare through the gratification of desires and wants and to avoid ill-fare through the dispelling of hostile agents. The devotee or sun-dancer indulges in the ceremony to fulfil a vow, made by him during the previous winter or season from various motives, that he would make a prayer to the disposer of what he needs through an appeal to the sun, to 'Wakanda' (among the Sioux). The Tetons call the ceremony by a name which means 'They dance looking at the sun.' In it the moon is regarded as the representative of the sun, hence the dancers gaze at it just as they do at the sun Among the principal objects in the festival of the sun-dance is the sun-pole or 'mystery tree' (symbolic of the center of the four quarters of the heavens), the sacred tent of preparation erected within the so-called camping-circle of the tribe, wild sage, a sweet-smelling grass called *wachañga* by the Teton, and the dancing-lodge. Each devotee persists in his part until he has received a vision from the sun; but if at the close of

the ceremony no such vision has been vouchsafed to him, resort is had to self-sacrifice, which is called 'vision-hunting.' One of the characteristic forms of self-sacrifice is that of having two wooden skewers inserted underneath strips of skin raised by slashing the breast or back, to which stout thongs are made fast, by which the devotee is drawn up and fastened to the sun-pole, to which he remains suspended until his weight, sometimes made greater by having a buffalo-skull hung to his person by similar skewers, causes the latter to rend the skin, thus letting the devotee fall to the ground, usually in a faint; another may have a buffalo-skull suspended from thongs passing through raised strips of the skin on the back or breast, which is allowed to hang thus until the skin is parted by violence and the thongs are freed. Some men who do not intend to dance seat themselves near the sun-pole, and small pieces of flesh are cut out in a row from the shoulders of each; these are offered to the being represented by the sun-pole. Women do not scarify themselves in the sun-dance, and self-torture and the shedding of blood are not practised in the Kiowa ceremony.

SUNDAY, n. *sŭn'dā* [AS. *sunnan dæg*, Sunday—from *sunnan*, of the sun; *dæg*, day: Dan. *söndag;* Dut. *zondag*, Sunday—so called from its being the day dedicated to the particular worship of the *sun*]: first day of the week; the Christian Sabbath, properly the Lord's Day: ADJ. pertaining to the Lord's Day. See SABBATH.

SUNDAY SCHOOLS: schools on the Lord's Day for religious instruction. They are usually said to have been founded about 1780-1 by Robert Raikes, printer, in Gloucester, England. Visiting the suburbs inhabited by the lowest class of people, he was struck with concern at the noise and riot and the cursing and swearing of the dirty children in the streets; and he engaged four women, who kept dame schools, to instruct as many children as he should send them on the Sunday, in reading and the church catechism, for which each teacher was to receive one shilling a day. Improvement soon appeared in the manners and morals of the children, who came in considerable numbers; and many learned to read, and to say their catechism. This humble endeavor by Raikes was doubtless the occasion of the great modern Sunday-school movement which has become one of the chief religious features of the 19th century: it was the first stir that succeeded in developing into a general popular impulse, and thence into a world-wide system of Sunday schools. But this was very far from being the first Sunday school in Britain or America: John Knox founded Sunday schools in Scotland about 1560; Joseph Alleine in Bath, England, 1650-68; Bp. Frampton, in England about 1693; and Sunday schools were formed at Glasgow (about 1707) and Brechin (1760), Scotland, also at several places in England and Ireland before 1780.

SUNDAY SCHOOLS.

The first Sunday school in the United States was at Roxbury, Mass., 1674. Indeed, Sunday schools date from the early Christian centuries. Luther founded them (or their equivalent) 1529. Cardinal Archbishop Borromeo in Milan established them (1560-84) throughout his diocese, on a system almost the same as that now in vogue. John Wesley organized and conducted a Sunday school for boys and girls in Savannah, Ga. (1735-7), in the house of Charles De la Motte, one of his Oxford chums.

Returning to the modern Sunday-school movement in England, we find that in 1784 general attention was drawn to Raikes's plan; numerous schools on the same model sprang up in all the principal English towns; and a society was formed in London 1785 for establishment and support of Sunday schools throughout the kingdom. Like all new movements, this met strong opposition. Many good people foresaw great danger in its tendencies; the bishop of Rochester openly attacked it; the archbishop of Canterbury summoned the bishops into consultation concerning measures for stopping it; some Scotch presbyteries discountenanced it. This was the first stage of the Sunday school. Its chief practical impediment was the expense of hiring so many teachers. Even in Gloucester, the birthplace of modern Sunday schools, all the Sunday schools were closed for a time for lack of funds. The idea of gratuitous instruction was probably suggested by necessity to many minds: it was the means of starting Sunday schools on a new career; and the idea spread so rapidly that in 1800 the teaching had become almost universally gratuitous. A higher class of teachers offered their services; the schools ceased to be filled by the very poorest alone; and handsome buildings were erected in connection with the different churches and chapels, or by general subscription. The secular teaching, which in certain instances included writing and arithmetic, was not of very high order; but it placed the key of knowledge in the hands of multitudes who would otherwise never have been able to read; and the religious instruction which was combined has wrought unmeasured good. In 1803 the London Sunday-school Union was formed, which now issues numerous publications and has travelling agents and branch societies in every part of the kingdom. In later years the Sunday school entered on a third stage; the multiplication of week-day schools having obviated the necessity for teaching reading in Sunday schools, they gradually became restricted to religious instruction; and this is now their work.

In Scotland, Sunday schools found public recognition 1782, and became general 1797. At first they met opposition in some of the presbyteries; but they long ago received the support of all the churches. The names of Dr. Chalmers, James Gall, author of the *Lesson System*, and David Stowe, author of the *Training System*, deserve

mention in connection with the progress of Sunday schools in Scotland. In Ireland, Raikes's system of Sunday schools was adopted 1785; and the Sunday School Society for Ireland was established 1809.—Sunday schools thrive in the Protestant churches of France; and through the assiduous efforts and aid of Albert Woodruff, of Brooklyn, N. Y., have in recent years had great extension in that country. They have been planted in parts of Germany and Italy. The missionaries carry them to all heathen lands.

In the United States, a Sunday school was organized in Roxbury, Mass., 1674; in Plymouth, Mass., 1680; in Bethlehem, Conn., by Dr. Joseph Bellamy 1740, and it is claimed much earlier; in Ephrata, Pa., by Ludwig Häcker 1639-40, continuing more than 30 years and blessed with many revivals, and in Savannah, Ga., in 1735, as noted above. In 1790 the Methodist conference at Charleston, S. C., directed the formation of Sunday schools for white and for black children, with unpaid teachers. In 1791, under influence from the movement in Britain, a First-day or Sunday-school society was formed in Philadelphia, and still continues. The New York Female Sunday-school Union, and another, male, were organized 1816. The Philadelphia Sunday and Adult School Union was founded 1817, and enlarged into the American Sunday-school Union (undenominational) 1824. This society issued the first book for its schools, *Little Henry and his Bearer*, 1817; employed its first permanent missionary 1821; issued its first illustrated paper for children 1823; its first monthly for teachers 1824; its first uniform lessons 1826, followed by question books and teachers' assistants; a Bible Dictionary, Biblical Antiquities, Biblical Geography, Notes on Lessons, 1827-33; and its first weekly journal for teachers 1830. In 62 years this society organized 79,000 schools, with 3,320,000 pupils; assisted 131,000 schools; and distributed by sale and gift $8,000,000 worth of religious literature. The Massachusetts Sunday-school Union was formed 1825, succeeded by the Mass. Sabbath-school Soc. 1832, and this by the Congl. Sabbath-school and Publishing Soc. 1868. The Meth. Episc. Sunday-school Union was begun 1827, and reorganized 1844; its work has very great extent. The Presb., Bapt., and Luth. publication boards have Sunday school departments, and the Evangelical Knowledge Soc. cares for Sunday schools in the Prot. Episc. Church. Other denominations have similar arrangements. The Rom. Cath. Sunday schools are everywhere active and prosperous.—Conventions to promote this cause were held in the eastern and middle states 1820-26; national conventions in New York 1832, in Philadelphia 1833 and 59, in Newark, N. J., 1869, in Indianapolis 1872 (when uniform lessons were adopted), in Baltimore 1875, Atlanta 1878, Toronto 1881, Louisville 1884. Institutes for teachers were held 1864-75, followed by summer 'assemblies.' The list of

lessons agreed upon for 1872 was so well received that a seven years' course was prepared, and this system has since come in general and even international use—in the United States, Great Britain, and many other European countries, Mexico, Australia, Syria, India, China, etc.—among many Protestant denominations. Since 1906, there has risen an open opposition to the 'machine made' character of these lessons, and many of the most progressive Sunday schools have abandoned them. The great importance of the Sunday school in any scheme of church activity is shown by the increasing tendency to hire salaried teachers, who have trained for this work at some of the schools where the methods of Bible study and Sunday school pedagogics are made special features.

The Sunday school statistics compiled for the centennial of the Sunday school Union of London, 1903, were revised for the World's Sunday school Convention, held at Jerusalem in 1904. The statistics for North American Sunday schools were again revised in 1905:

	Sunday Schools.	Teachers.	Scholars.	Total.
Great Britain and Ireland...	53,590	674,123	7,300,340	7,974,463
United States...	140,519	1,451,855	11,329,253	13,209,114
Canada	10,750	85,632	684,235	790,566
Central America.	231	577	5,741	6,318
	434	1,266	13,797	15,063
Total World..	262,131	2,426,888	22,739,323	25,614,910

Bibliography.—Vincent, *The Modern Sunday School;* Watson, *History of the Sunday School Union;* Dupanloup, *The Catechist;* Howe, *The Catechist;* Trumbull, *Yale Lectures on the Sunday School;* Article on Sunday School Teaching in the *Pedagogical Magazine* (Clark University, Worcester, Mass.); Watson, *The First Fifty Years of the Sunday School;* Brown, *Sunday School Movements in America;* Hamill, *The International Lessons;* Trumbull, *Teaching and Teachers;* Pattison, *The Ministry of the Sunday School;* Foster, *A Manual of Sunday School Methods;* Messmer, *Spirago's Method of Christian Doctrine;* O'Brien, *Advanced Catechism;* Daniel, *Lessons on Catechism;* Kinkead, *Explanation of Catechism;* Clark, *Spirago's Catechism Explained.* Other works giving the explanation of the *Catechism* are by Perry, Furniss, Hueser, Deharbe, and Cafferta.

SUNDER, v. *sŭn'dėr* [Icel. *sundr,* in separate parts; *sundra,* to tear to pieces: Ger. *sonder,* separate: Dan. and Sw. *sönder,* apart]: to part; to separate; to divide. SUN'DERING, imp. SUN'DERED, pp. *-dėrd.* IN SUNDER, in two parts. SUN'DRY, a. *-drĭ,* more than one or two; several. SUN'DRIES, n. plu. *-drĭz,* several things; collections of things or items of various kinds, too many or small to be particularized.

SUNDERBUNDS, n. *sŭn'dėr-bŭndz:* alluvial tracts in British India, presidency of Bengal, comprising a number

of low islands, forming the delta of the Ganges. The tract extends e. from the mouth of the Hoogly to the island Rabanabad; 158 m. long, 75 m. broad; 5,341 sq.m. The population is inconsiderable. The islands are separated by narrow channels, through which the waters of the Ganges force their way to the sea. The chief channels (14 in number) are navigable for the largest craft in inland navigation. In such of the islands as have not been cleared, are luxuriant forests—lairs for the tiger, wild boar, and other ferocious animals. Large and fierce alligators abound in the channels. There have been vigorous governmental operations for the clearing of the islands. The climate, though improving, is still very unhealthful. Rice, sugar, and indigo are produced in the cleared districts. Large quantities of fish from the waters of the Sunderbunds are sent to Calcutta.

SUNDERLAND, *sŭn'dĕr-land:* thriving municipal and parliamentary borough and seaport, county of Durham, England; at the mouth of the Wear, 13 m. n.e. of Durham, 12 m. s.e. of Newcastle, 77 m. n.n.w. of York. The town may be said to be coextensive with the parliamentary borough, and to include the suburbs Bishop-Wearmouth on the s. bank, and Monk-Wearmouth and Southwick on the n. bank of the river, connected with Sunderland proper by an iron bridge of one arch, 236 ft. long, and nearly 100 ft. above the river at low water. The bridge over the Wear was erected 1796, repaired and widened 1858 by Robert Stephenson. On both sides of the river are extensive wet docks, largely reclaimed from the sea. The harbor, defended by batteries, is formed by two great piers, one 1,950 ft., the other 1,500 ft. in length; and the port is resorted to by vessels of the largest tonnage, from all commercial countries. The exports (chiefly coal) have a value of more than £700,000 per annum. After Newcastle, Sunderland is the greatest coal-shipping port in the world. There is a large infirmary and a spacious workmen's hall. Shipbuilding is one of the principal industries. Glass, earthenware, ropes, and chains, anchors, and other iron-wares, are very extensively manufactured. The public park of about 70 acres is adorned with a bronze statue of Gen. Sir Henry Havelock, native of the town. In 1881 the harbor extension was decided on. There is a considerable fishery. Pop. municipal borough (1901) 146,565.

SUN'DERLAND, CHARLES SPENCER, third Earl of: 1675-1722, Apr. 19; second son of the second earl. He was sec. of state in the reign of Queen Anne, and under George I. rose to be all-powerful; but 1721, being accused of accepting an enormous bribe from the directors of the South Sea Scheme, he found it necessary to resign office. He was naturally a plotter and schemer, and was under suspicion of having intrigued for restoration of the tories, if not for the Pretender's return. His title descended to CHARLES SPENCER, his second son who suc-

ceeded 1733 to the honors of his illustrious grandfather, John Churchill, when the earldom of S. became absorbed in the dukedom of Marlborough.—His third son, JOHN SPENCER, was ancestor of the Earls Spencer.

SUNDERLAND, ROBERT SPENCER, second Earl of: 1642–1702; only son of HENRY, first earl, who had been raised to the peerage 1643, for his exertions in the royal cause. After serving as ambassador to several courts, he became 1679 sec. of state. Bp. Burnet says of him: 'He had a superior genius to all the men of business that I have yet known.' At first, he united with Essex and Halifax in opposing Shaftesbury, who wished to set Monmouth on the throne, and favored the exclusion of the Duke of York. He encouraged the king to persevere in the degrading French alliance, and, with the Duchess of Portsmouth, to whom he attached himself, negotiated a treaty by which, in consideration of an annual pension from the French king, Charles was to agree to assemble no parliament for three years. Before the end of the year, S. had shaken off Essex and Halifax; and a new triumvirate, S., Lord Hyde, and Godolphin, succeeded to the confidence of Charles II. The treaty with France was broken off; and S., now afraid of the whigs, engaged the king in a more popular alliance with Spain. After the dissolution of the last of the exclusion parliaments, he lost his office; but the duchess remained faithful to him in disgrace; and by her influence, and that of Lord Rochester, he was, 1682, says Bp. Burnet, 'upon great submission made to the Duke [of York], again restored to be secretary.' He remained in office until the accession of James II., when his influence in the ministry became greater than ever. He who had so often saved himself in the former reign by the influence of the Duchess of Portsmouth, now secured himself another patroness in the king's second wife, Princess of Modena. Although there is reason to believe that he gave some encouragement to Monmouth in his rebellion, he managed with consummate art to obtain the entire confidence of James, and 1685 became prime-minister. He was intrusted with a knowledge of the king's intention to establish the Rom. Cath. as the national church. In 1687, he privately conformed to the Rom. Cath. Church, and afterward openly professed his conversion. His influence was so great that James would grant no favor until he had asked the question: 'Have they spoken to Sunderland?' Yet we find S. about this time in correspondence with the Prince of Orange, afterward William III. Princess Anne described S. as 'the subtillest workingest villain that is on the face of the earth.' Burnet says that he entered into a particular confidence with the Prince of Orange. With profligate but masterly dexterity, he contrived to deceive both his master and Barillon, and to keep them in ignorance of the events passing in Holland. When the prince arrived in England, S. and his wife went to Amsterdam, whence he wrote to the new monarch, claiming his favor and protection on the ground that he had all along been in his

interest. In 1691, he was allowed to return to England, and to kiss the king's hand. In 1695, William III. spent a week at S.'s house at Althorpe. It was imputed to him that he had changed his religion, in the late reign, in order more effectually to ruin King James; and it was generally believed that he had rendered King William, when Prince of Orange, some signal services, which no one else could have done: this belief gained credit from the favor shown him by William. He was made lord chamberlain, and as such took his seat at the head of the council-table. After directing affairs as the acknowledged head of the govt., he resigned office 1697, and retired to private life at Althorpe, where he died. His influence over James II. was largely the cause of that king's discreditable measures.

SUN'DEW (*Drosera*): beautiful and interesting genus of plants of nat. order *Droseraceæ*, three species of which are natives of Britain, found in bogs and moist heathy ground. The most common is the ROUND-LEAVED S. (*D. rotundifolia*). The leaves all spring from the root, and spread out in a rosette, from whose centre springs the flower-stem or scape, with a raceme of flowers all on one side. The leaves of this and the other species are fringed and beset in all parts with hairs, which bear at their extremity viscid glands, and the irritation of these glands causes them to contract and fold up, so that insects are imprisoned by them. Recent observation has proved that these insects are actually digested by the plant, their nutritive material being absorbed by it. Compare the *Dionæa* (q.v.), and see Darwin's *Insectivorous Plants* (1875). The whole plant is acrid, curdles milk, and has reputation for removing corns, bunions, and warts. An agreeable liqueur, *Rossoli* (*Ros Solis*) is made by infusing the plant in brandy, with sugar, etc.

SUN'FISH (*Orthagoriscus*): genus of fishes, of family *Orthagoriscidæ*, having the body abruptly terminating in a very short tail; the dorsal and anal fins long and pointed, united to the short tail-fin; each jaw furnished with a cutting edge of bone instead of teeth. The species chiefly inhabit the seas of warm climates and their food is sea weeds. The SHORT S. (*O. mola*) is found in all warm and temperate seas, and, when young, is almost perfectly round, but becomes rather more elongated when full grown. The name S. is regarded variously as derived from the form of the fish, and from its habit of floating at the surface of the water, in fine weather, as if to enjoy the sunshine. It attains large size, sometimes more than six ft. in length; and is captured by sailors. Its flesh is not esteemed, becoming when cooked an oily mass of fibres. The liver yields a large quantity of oil, in repute among sailors as an application for cure of sprains, rheumatism, etc. The OBLONG S. (*O. oblongus*) is of longer form, and attains large size.—The name S. is applied also to many other fish, in America especially to the 'pumpkin-seed' fish of the brooks.

SUN'FLOWER (*Helianthus*): large annual plant, of order *Compositæ*. There are many varieties, ranging from the dwarf sorts which grow only 2 ft. high and have blossoms 2 in. across, to the giant sorts which reach a height of 15 ft. with blossoms 18 in. across. In some varieties the main stem sends out many branches which also produce flowers. The popular idea that the flowers of this plant always turn toward the sun, is incorrect. There are about 50 species, some annuals, others perennials. The plant is a native of N. America, but has been widely disseminated and is now largely grown in s. Europe. It is a common plant in gardens in the United States; in some places is grown as a preventive of malaria; is cultivated sometimes on treeless prairies for its stalks, used as fuel; and is often grown for the seeds, of which 50 bushels per acre are sometimes obtained. The seeds are valuable for feeding to poultry and cattle, and for making an oil nearly equal to that of the olive. The S. is also a honey-yielding plant, the pith is sometimes used as a substitute for the genuine moxa, and the leaves are fed to cattle. On account of the large proportion of potash which it contains, a S. crop rapidly exhausts the soil.

The indigenous species of *Helianthus* in the United States are many; they are coarse and stout herbs with perennial root, and distinguished from plants of similar appearance by marginless flattened achenia, with two deciduous chaffy scales, not barbed nor toothed, and a chaffy receptacle. The most of them abound s. and w., flowering late in the season, when, in company with the Purple-Cone Flower and the Blazing Star (*Liatris*), they give to prairies a popular reputation for floral display. Of species found e. are *H. giganteus*, 3–10 ft. high, with nearly sessile leaves, rough-hairy beneath; *H. divaricatus*, 1–4 ft., with smooth opposite leaves; and *H. decapetalus*, 3–6 ft., with thin coarsely serrate leaves, supposed original of the cultivated *H. multiflorus*, the disk of which is concealed by abundant petals. *H. doronicoides*, 5–9 ft., of Penn. to Ill. and s., leaves rough above and smooth beneath, is probably the original of the Jerusalem Artichoke (q.v.)—its name a curious corruption of the Italian *Girasole*, a sunflower.

SUNG, v. *sŭng:* pp. of SING, which see.

SUNGA'RIA, or SOONGA'RIA: see DZUNGARIA.

SUNK, v. *sŭngk:* pp. of SINK, which see

SUNKEN, a. *sŭngk'n* [Ger. *sinken;* Sw. *synka*, to fall to the bottom (see SINK)]: lying on the bottom of a river or piece of water; low, as land.

SUNN, n. *sŭn* (*Crotalaria juncea*): leguminous plant (see CROTALARIA), native of India, and in general cultivation there from time immemorial, for the fibre of its bark, which also is called Sunn. It has general resemblance to Spanish Broom, but is an annual. It is cultivated for its fibre, and as food for milch-cows. The seed is sown in April or May, and in Aug. it is pulled, or cut close to the ground—when grown for its fibre—laid in long rows till the leaves begin to rot and separate from the stalks, and

steeped in water for a few days till the bark separates freely. The fibre is not so strong as hemp; yet good cables, canvas, and cloth are made of it. It is exported in considerable quantity. *Taag* is one of its Indian names, and it is sometimes called *Brown Hemp, Bengal Hemp,* etc.

SUNNA, *sŭn'nâ* (Ar., custom, legal usage): originally among Muslims the sayings and the example of Mohammed and his community, provided they are in accordance with the Koran, the meaning of which, however, is itself explained by the S. The term is therefore (incorrectly) used for the collections of moral and legal traditions traced to the Prophet, which supplement the Koran, somewhat like the Mishna (q.v.), which for the Jews supplements the Laws of the Pentateuch. The S. comprises not only religious doctrines and practice, but also civil and criminal laws, and the usages of common life. This tradition is heard of first during the civil wars among the adherents of the new faith, about half a century after the Flight. The single traditions, as we now possess them, rarely exceed six lines. The diction is carefully wrought, and the form is that of dialogue. For the credibility and canonicity of a tradition, it was originally necessary that it should have been *heard* by one truthful witness; but this law was much relaxed in after-time. At the end of the 3d c. H., i.e., early in the 10th c., a countless number of individual collections (Mosnad), mostly apocryphal, had been produced by different theologians; but the first who sifted them critically, without regard to any special theological system, was Bochary (d. 256 H., or about A.D. 870). His collection contains 7,275 single traditions, 4,000 being duplicates. Moslim, his pupil, supplemented Bochary with another collection, containing 12,000, again including 4,000 repetitions. Besides these, there are four more 'canonical' collections; by Abû Dawûd (d. 275 H.), Tirmidzy (d. 279 H.), Nasây (d. 303 H.), and Mâga (d. 273 H.). The S., critically used, is next to the Koran, the most authentic source of Islam. A selection from the different collections (both canonical and other), called *Mishcat Al Masabih,* has been transl. into Eng. by Capt. Matthews (Calcutta 1809).

SUNNINESS, SUNNY: see under SUN.

SUNNITES, n. plu. *sŭn'nīts* [Ar. *sunna,* to regulate, to prescribe as law]: orthodox Mohammedans who receive the *Sunna* (q.v.), a collection of laws and precepts of Mohammed handed down by tradition, as of equal importance with the Koran. SUNNIAH, n. *sŭn'nĭ-â,* one of the sect of Sunnites.—The *Sunnites* are traditionists, and are bitterly opposed to the Shiites (q.v.). They are subdivided into four principal sects, which, though at issue on minor points, are acknowledged, by one another, to belong to the Faithful, and to be capable of salvation; and each has a special oratory at Mecca. The first of these sects are the Hanefites, founded by Abu Hanifa (d. H. 150, or about A.D. 768). They are called 'the followers of reason,' while the other three are guided exclusively by tradition. They allow reason to have a principal share in their decisions on legal

and other points: to this sect belong chiefly the Turks and Tartars. The second sect are the Malekites, founded by Malek Ibn Ans (d. Medina about H. 180, or A.D. 798): as a proof of his piety and humility, it is recorded that when asked for his decision on 48 questions, he would decide on only 16, confessing his ignorance about the others: in Barbary and other parts of Africa, the greatest part of his adherents are found. Mohammed Al Shâfeï (b. Palestine, 150 H. or about A.D. 768,), educated in Mecca, was founder of the third sect, the Shâfæites: he was a great enemy of the scholastic divines, and seems to have been of an original cast of mind. He never swore by God, and always took time to consider whether he should at all answer any given question or hold his peace. The most characteristic saying recorded of him is: 'Whosoever pretends to love both the work and the Creator at the same time is a liar.' He is accounted of such importance, that, according to his contemporaries, 'he was as the sun to the world, and as health to the body;' and all the relations of the traditions of Mohammed were said to have been asleep until he came and woke them. He appears to have been the first who reduced Muslim jurisprudence into a method, making it from a number of vague sayings a science. His followers are found chiefly in Arabia and Persia. Ahmed Ibn Hanbal, intimate friend of Shâfeï, founded the fourth sect, the Hanbalites: he was b. 164 H., or about A.D. 781. His knowledge of the traditions (of which, as is reported, he could repeat no less than a million) was as famed as was his piety. He taught that the Koran was not created, but everlastingly subsisted in the essence of God; a doctrine for which he was severely punished by the caliph Al-Motasem. On the day of his death, no less than 20,000 unbelievers (Jews, Christians, and Magians) are said to have embraced the Mohammedan faith. Anciently very numerous, the Hanbalites now are rarely met with out of Arabia.—The S. are the regular orthodox Mohammedans, and greatly outnumber the Shiites, who are estimated at about 20,000,000: for the differences between the two, see SHIITES.

SUN'-STROKE: see THERMIC FEVER.

SUN WORSHIP—FIRE WORSHIP: widely extended form of ancient pagan religion. Investigation tends to show that nature-worship was the basis of all polytheistic religions, and that the chief deities of the several mythologies were originally personifications of the sun or of particular influences of the sun. The original solar nature of Jupiter, Zeus, Odin, Baal, Amen Ra (see EGYPT), Indra, etc., can hardly be mistaken. See those titles; also SCANDINAVIAN MYTHOLOGY: PHŒNICIA: and for full treatment of the subject, Max Müller's essay on *Comparative Mythology* (Oxford Essays, 1856). The actual sun, however, still continued an object of worship; especially as in the abstract and more strictly personal gods, moral and intellectual attributes came to predominate over and obscure the physical (see HELIOS); and with the worship of the sun was more or less closely associated that of fire—his

representative on earth: see PARSEE: GUEBRES: NEED FIRE: BELTANE.

The most complete system of sun-worship known was that existing in Peru when discovered by the Spaniards (1526). 'The sun, and the moon, and the stars were imaged in the heart of a Peruvian, and dwelt there;' they 'were his personal friends, as well as his deities; with outstretched arms he appealed to them against their own unkindness, or against the injustice of his fellowman.'—Help's *Spanish Conquest of America*. The Incas, Peruvian monarchs, claimed to be children of the sun, and his representatives on earth: their government was a despotic theocracy, of which the Inca was both high-priest and king. In Cuzco, the capital, stood a splendid temple to the sun, all the implements of which were of gold. On the w. end of the interior was a representation of the sun's disk and rays in solid gold, so placed that the rising sun, shining in at the open east end, fell full upon the image, and was reflected with dazzling splendor. In the place or square of the temple, a great annual festival was held at the summer solstice. The multitude, assembling from all parts of the empire, and presided over by the Inca, awaited in breathless solemnity the first rays of their deity to strike the golden image in the temple, when the whole prostrated themselves in adoration. Sacrifices, similar to those of the Jews, were offered on the occasion, and bread and wine were partaken of in a manner strikingly resembling the Christian communion.

Not only the sun received the devotion of the Peruvians: 'The Moon as the spouse of the Sun, the planet Venus as his page, the Pleiades, and the remarkable constellation of the Southern Cross, were minor deities. The rainbow and lightning were worshipped as servants of the sun; and fire, air, earth, and water were not without adoration.'

SUONADA, *sō-on-ä'da*, called also *Seto-Uchi*, 'inland sea'): inland sea of Japan, separating the islands Kiushiu and Shikoku from the main island, Honshiu or Hondo; about 250 m. long from the strait of Simonoseki to Osaca; greatest breadth about 50 m. It is studded with innumerable islets The scenery is singularly beautiful and picturesque, but the navigation is difficult. The prince of Nagato and Soulio having, contrary to treaty stipulations, closed this sea to foreign vessels and fired on them, the English, French, and Dutch fleet 1866 destroyed the forts that barred its entrance.

SUP-, *sŭp:* a form of the Latin prefix SUB, which see.

SUP, v. *sŭp* [Icel. *supa*, to sup up liquids: Dut. *zuipen;* Sw. *supa;* Low Ger. *supen*, to drink copiously—connected with *sip* and *soup*]: to take by little at a time, or by mouthfuls, as a liquid; to sip; to eat the evening meal; to treat with supper: N. a small draught or mouthful of a liquid; a sip. SUP'PING, imp.: N. the act of taking supper. SUPPED, pp *sŭpt*, having taken the evening meal. SUP'PER, n. *-pĕr* [F. *souper*]: the meal at which *soup* formed the principal dish; the evening meal: V. to give its evening

meal to, as to a horse in prov. language; to take supper. SUP'PERING, imp. SUPPERED, pp. *sŭp'ĕrd.* SUP'PERLESS, a. *-lĕs,* being without supper. THE LORD'S SUPPER, the Eucharist; the sacrament among Christians wherein eating bread and drinking wine 'show forth Christ's death.'

SUPER, *sū'pĕr* [L.]: a prefix signifying 'above;' over; in excess: *super* has sometimes the French form *sur:* N. in *theatrical language,* a contr. of SUPERNU'MERARY.

SUPERABLE, a. *sū'pĕr-ā-bl* [L. *superab'ĭlĭs,* that may be overcome—from *supĕro,* I overcome—from *super,* above: It. *superabile*]: that may be overcome or conquered. SU'PERABLY, ad. *-blĭ.* SU'PERABLENESS, n. *-bl-nĕs,* the quality of being surmountable.

SUPERABOUND, v. *sū'pĕr-ă-bound'* [L. *super,* in excess, and *abound*]: to be very abundant; to be more than enough. SU'PERABOUND'ING, imp. SU'PERABOUND'ED, pp. SU'PERABUN'DANT, a. *-bŭn'dănt,* being more than enough. SU'PERABUN'DANTLY, ad. *-lĭ.* SU'PERABUN'DANCE, n. *-bŭn'dăns,* exceeding plenty; more than enough.

SUPERADD, v. *sū'pĕr-ăd'* [L. *super,* above, and *add*]: to add over and above. SU'PERAD'DING, imp. SU'PERAD'DED, pp. SU'PERADDI'TION, n. *-ăd-dĭsh'ŭn,* the act of superadding; that which is added over and above.

SUPERANGELIC, a. *sū'pĕr-ăn-jĕl'ĭk* [L. *super,* above, and *angelic*]: having a nature or being superior to that of angels; connected with the world beyond that of angels.

SUPERANNUATE, v. *sū'pĕr-ăn'nū-āt* [L. *super,* above; *annus,* a year]: to impair or disqualify by age or infirmity; to allow to retire from service on a pension on account of age or infirmity; to pension; in *OE.,* to outlast the year. SU'PERAN'NUATING, imp. SU'PERAN'NUATED, pp.: ADJ. disqualified by old age; allowed to retire on a pension on account of age or infirmity. SU'PERAN'NUA'TION, n. *-ā'shŭn,* state of being too old for office or business; the pension granted for long service, etc. In the Brit. civil service, officials after the age of 60 receive a retiring allowance—the retirance being voluntary: the allowance is graduated in amounts increasing according to the number of years in service.—In the United States there are no civil pensions except those granted by act of congress (1869) to judges of U. S. courts, who, after serving 10 years and reaching the age of 70 years, shall resign their offices; they receive full salary for life. Special grants, however, have been made by congress to individuals for extraordinary reasons, among the latest being pensions to the widows of ex-presidents.—See PENSIONS AND PENSIONERS.

SUPERB, a. *sū-pĕrb'* [F. *superbe,* proud—from L. *super'bus,* haughty—from *super,* above]: distinguished by grandeur, pomp, or richness; stately; showy; elegant. SUPERB'LY, ad. *-lĭ,* richly; elegantly; pompously. SUPERBNESS, n. *sū-pĕrb'nĕs,* the state of being superb.—SYN. of 'superb': grand; great; sublime; noble; majestic; imposing; splendid; magnificent; august; rich; pompous

SUPERBIPARTIENT, n. *sū'pĕr-bī-pär shĭ-ĕnt* [L. *super*, over, above; *bis*, twice; *partiens*, pp. of *partior*, to divide]: a number which divides another number nearly, but not exactly, into two parts.

SUPERCARBONATE, n. *sū'pĕr-kär'bō-nāt* [L. *super*, above, in excess, and *carbonate*]: a carbonate which holds the greatest possible quantity of carbonic acid.

SUPERCARGO, n. *sū'pĕr-kär'gō* [L. *super*, above, and *cargo*]: important officer in a merchant-ship, who manages the sales and superintends all the commercial concerns of the voyage.

SUPERCELESTIAL, a. *sū'pĕr-sĕ-lĕst'yăl* [L. *super*, above, and *celestial*]: situated above the firmament.

SUPERCHARGE, v. *sū'pĕr-chärj* [*super*, and *charge*]: in *her.*, to place one bearing on another: N. a bearing or figure placed upon another.

SUPERCILIA, n. plu. *sū'pĕr-sĭl'ĭ-ă* [L. *super*, above: *cĭlĭum*, an eyelid; *cĭlĭa*, eyelids]: the eyebrows, consisting of two arched eminences of integument, which surmount the upper circumference of the orbit on each side, and support numerous short, thick hairs. SU'PERCIL'IARY, a. *-sĭl'-ĭ-ĕr-ĭ*, situated above the eyebrow.

SUPERCILIOUS, a. *sū'pĕr-sĭl'ĭ-ŭs* [L. *supercilĭōsus*, haughty—from *supercĭl'ĭum*, an eyebrow, arrogance—from *super*, above; *cĭlĭum*, an eyelid]: expressing lofty pride by raising the eyebrows; haughty; dictatorial; arrogant; overbearing. SU'PERCIL'IOUSLY, ad. *-lĭ*. SU'PERCIL'IOUSNESS, n. *-nĕs*, haughtiness; an overbearing manner.

SUPERCOLUMNAR, a. *sū'pĕr-kō-lŭm'nĕr* [L. *super*, above, and *columnar*]: in *arch.*, put one above another, as an order. SU'PERCOLUMNIA'TION, n. the putting of one order above another.

SUPERDOMINANT, n. *sū'pĕr-dŏm'ĭ-nănt* [L. *super*, above, and *dominant*]: in *music*, the note above the dominant; the sixth note of the diatonic scale.

SUPEREMINENT, a. *sū'pĕr-ĕm'ĭ-nĕnt* [L. *super*, above, and *eminent*]: eminent in a very high degree; surpassing others in excellence. SU'PEREM'INENTLY, ad. *-lĭ*. SU'PEREM'INENCE, n. *-nĕns*, excellence in a high degree; eminence superior to what is common; also SU'PEREM'INENCY n. *-nĕn-sĭ*.

SUPEREROGATION, n. *sū'pĕr-ĕr'ō-gā'shŭn* [L. *super*, in excess; *erŏgo*, I ask for a grant of public money, I expend—from *ex*, out of; *rogo*, I ask]: performance of more than duty requires. SU'PEREROG'ATORY, a. *-ĕr-ŏg'ă-tĕr-ĭ*, performed to an extent not enjoined or required by duty. WORKS OF SUPEREROGATION, class of works which, in the Rom. Cath. system, are described as not absolutely required of each individual as conditions of his eternal salvation. Rom. Catholics found this definition on the distinction between what they believe to be commanded and what they hold to be only counselled, for an example of which they appeal to the words of the Lord Jesus to the young man, Matt. xix. 21, in which Christ distinguishes one class

of works necessary in order to 'enter into life,' and a further class which must be done if we 'would be perfect.' Rom. Catholics do not profess to recognize in works of S. any distinctive essential quality by which they differ in physical or moral entity from other works, and in virtue of which, by their own nature, the individual may found on them a personal claim to reward. For works of S., as for all supernaturally good works, they hold that the assistance of God's grace is indispensable; and they do not ascribe to them any merit, except that which arises from God's own free and gratuitous promise and act. The one distinctive characteristic of a work of S. is in its not being prescribed or commanded as absolutely necessary for the salvation of the individual, and its being done for the sake of greater perfection; and the doctrine which teaches the possibility of such works is, according to Rom. Catholics, a necessary consequence of the unequal fervor and unequal degrees of holiness which exist even in the class of the virtuous servants of God. A consequence of the doctrine of S. is that God may accept the superabundant works of one in atonement for the defective service of another; hence in the theory of Indulgences (q.v.), with what they regard as the infinite and inexhaustible treasure of the merits of Christ, they regard also, though in a degree infinitely inferior, the superabundant merits of the saints as forming part of that 'treasure of the church' applied in the form of indulgences.

SUPERESSENTIAL, a. *sū'pĕr-ĕs-sĕn'shăl* [L. *super*, above, and *essential*]: essential above others.

SUPEREXALT, v. *sū'pĕr-ĕgz-awlt'* [*super*, and *exalt*]: to exalt to a superior degree.

SUPEREXCELLENT, a. *sū'pĕr-ĕk'sĕl-lĕnt* [L. *super*, above, and *excellent*]: superior in an uncommon degree. SU'PEREX'CELLENCE, n. *-lĕns*, very great excellence.

SUPEREXCRESCENCE, n. *sū'per-ĕks-krĕs ĕns* [L. *super*, above, and *excrescence*]: a superfluous growth.

SUPERFECUNDITY, n. *sū'pĕr-fĕ-kŭn'dĭ-tĭ* [L. *super*, above, and *fecundity*]: superabundant multiplication of the species.

SUPERFETATE, v. *sū'pĕr-fē'tāt* [L. *superfētātus*, conceived above another conception—from *super*, over; *fētus*, a bearing, a bringing forth]: to conceive anew while still with young.

SUPERFETA'TION: occurrence of a conception subsequent to the first, in the same female, and while the fetus of the previous conception is still in the uterus. Two fetuses of different ages—offspring possibly of different parents—may co-exist. The cases described as S. may be arranged in three classes; but only to the third class is the term truly applicable. The *first class* includes numerous undisputed cases in which two children bearing evidence in their different colors that they are offspring of different parents are born at the same time. In the slave states the birth from a black woman of a black and a mulatto child at

the same time was not very rare—the former being the offspring of her black husband, and the latter of a white man; the converse also has occurred—a white woman bearing at the same time a white and a mulatto child. There is no difficulty in accounting for these cases, which are instances of contemporaneous conception rather than true superfetation. The *second class* includes those cases in which a twin has been aborted, leaving its fellow undisturbed in the uterus, to be matured and born in due time; or in which twins have been produced at the same time—one fully formed, the other small and apparently premature, from being 'blighted' or arrested in its development at an early period. In these cases there is no reason for believing that the infants were conceived at different periods. The *third class* includes the cases in which a *mature* child has been born, and an *immature* fetus, product of a different conception, has either been left in the womb until its period of maturation, or, if expelled with the other, has presented no mark of wasting or of arrested development. Dr. Duncan believes, from anatomical investigations, that till the third month of gestation a second conception may follow the first; and he is of opinion that this will satisfactorily account for all the cases of superfetation on record.

SUPERFICIAL, a. *sū'pėr-fĭsh'ăl* [F. *superficiel*, superficial—from L. *superficĭalĭs*—from *superficĭēs*, the surface of a thing—from *super*, above; *facĭēs*, the face: It. *superficiale*]: being on the surface or exterior part; not penetrating beneath the surface; pertaining to surfaces; showy; without substance; slight; not deep or profound; shallow; more showy than real, as acquirements in any branch of knowledge. SU'PERFI'CIALLY, ad. *-lĭ*. SU'PERFI'CIALNESS, n. *-nĕs*, or SU'PERFICIAL'ITY, *-ĭ-ăl'ĭ-tĭ*, position on the surface; shallow, slight knowledge. SUPERFICIES, n. *sū-pėr-fish'ĭ-ēz*, the surface; outside; in *geom.*, that which has length and breadth only.

SUPERFINE, a. *sū'pėr-fīn'* [L. *super*, above, and *fine*]: very fine; surpassing in fineness, used especially of cloth. SU'PERFINE'NESS, n. *-nĕs*, the state or quality of being superfine.

SUPERFLUOUS, a. *sū-pėr'flû-ŭs* [L. *super'flŭus*, running over, unnecessary—from *super*, above; *fluo*, I flow: F. *superflu*]: more than enough or sufficient; beyond what is wanted; redundant. SUPER'FLUOUSLY, ad. *-lĭ*. SUPERFLUITY, n. *sū'pėr-flô'ĭ-tĭ* [F. *superfluité*—L.]: greater quantity than is wanted; superabundance; excess; redundancy.—SYN. of 'superfluous': unnecessary; needless; useless; exuberant; excessive.

SUPERFLUX, n. *sū'pėr-flŭks* [L. *super*, above; *fluxus*, a flowing—from *fluo*, I flow]: in *OE.*, more than what is necessary; that which is in excess of what is required.

SUPERFOLIATION, n. *sū'pėr-fō-lĭ-ā'shŭn* [L. *super,* above, and *foliation*]: foliation or leafage in excess.

SUPERHEAT, v. *sū'pėr-hēt'* [L. *super,* above, and *heat*]: in a *steam-engine,* to heat to excess; to heat steam above the boiling-point.

SUPERHUMAN, a. *sū'pėr-hū'măn* [L. *super,* above, and *human*]: above or beyond what is human; divine.

SUPERIMPOSE, v. *sū'pėr-ĭm-pōz'* [L. *super,* above, and *impose*]: to lay on something else. SU'PERIMPOSI'TION, n. *-pō-zĭsh'ŭn,* the act or state of being superimposed, or laid on something else.

SUPERINCUMBENT, a. *sū'pėr-ĭn-kŭm'bĕnt* [L. *super,* above, and *incumbent*]: resting on something else.

SUPERINDUCE, v. *sū'pėr-ĭn-dūs'* [L. *super,* above, and *induce*]: to bring in or upon, as an addition to something else. SU'PERINDU'CING, imp. SU'PERINDUCED', pp. *-dūst'.* SU'PERINDUC'TION, n. *-dŭk'shŭn,* the act of superinducing.

SUPERINTEND, v. *sū'pėr-ĭn-tĕnd'* [L. *super,* above, and *intend*]: to have or exercise the charge and oversight of; to have the care of with the power of direction; to oversee or overlook. SU'PERINTEND'ING, imp.: ADJ. overseeing; governing. SU'PERINTEND'ED, pp. SU'PERINTEND'ENT, n. *-tĕnd'ĕnt,* or SU'PERINTEND'ANT, n. *-ănt,* one who has the oversight and charge of something with the power of direction; an inspector; an overseer: ADJ. that overlooks others with authority. SU'PERINTEND'ENCE, n. *-ĕns,* the act of superintending; oversight; care; direction; management; also SU'PERINTEND'ENCY, n. *-ĕn-sĭ.*—SYN. of 'superintendent, n.': manager; supervisor; director; curator; keeper; foreman.

SUPERIOR, a. *sū-pē'rĭ-ėr* [F. *supérieur,* superior—from L. *superĭor,* higher; *supĕrus,* high—from *super,* above: It. *superiore*]: higher; more elevated or exalted in place, rank, dignity, office, or excellence; preferable; unaffected or unconquered, as 'a man *superior* to his sufferings': in *bot.,* placed above another organ—applied especially to indicate the position of the ovary with respect to the calyx: N. one of higher rank; one more excellent or more advanced than another; the chief or head of a monastery or convent; in *Scot.,* one who, or whose predecessor, has made the original grant of heritable property to a person called his *vassal,* which property is held by the vassal on such conditions as the payment of an annual fixed sum, or the performance of certain services (see FEU). SUPE'RIORS, n. plu. *-ėrz,* in *printing,* small letters or figures cast at the tops of the shanks of types, thus ([6]), used for references to marginal or foot-notes, and in works on mathematics. SUPE'RIOR'ITY, n. *-ŏr'ĭ-tĭ* [F. *supérriorité*—L.]: quality of being more advanced, higher, or more excellent in certain respects than another; pre-eminency; ascendancy. SUPERIOR PLANETS, the planets at a greater distance from the sun

than the earth, as Mars, Jupiter, Saturn, Uranus, and Neptune. SUPERIOR SLOPE, the upper surface of a parapet—SYN. of 'superiority': excellence; predominancy; prevalence; ascendancy; advantage; odds.

SUPERIOR: city, cap. of Douglas co., Wis.; on Lake Superior, Superior, Allouez, and St. Louis bays, and the Chicago, St. Paul and Omaha, the Duluth, S. Shore and Atlantic, the Great Northern, the Northern Pacific, the St. Paul and Duluth, and the Duluth and Winnipeg railroads; 8 m. s.e. of Duluth, Minn., comprises the ports known as E., W., S., and Old Superior. The three bays form excellent connected and land-locked harbors, on which the federal government, the city, and corporations have expended over $7,675,000 for improvements and shipping facilities. There are over 40 m. of water front and 10 m. of substantial wharfage, and the latter can be increased to over 150 m. by further improvements. The entire water front is divided into harbor districts, and the cost of improvements therein is assessed only on the district directly benefited. Superior bay is protected from storms by two narrow strips of land, Minnesota point and Wisconsin point; St. Louis bay is separated from Superior bay by Rice's and Connor's point; and between St. Louis and Allouez bays is Grassy point. The city is laid out at right angles with the water front, with avenues 100 ft. wide and streets 80 ft. Along the front are large coal docks, grain elevators, an extensive dry-dock, a dock used exclusively for handling iron ore, and several large ship yards. The city has through sewerage, water supply from Lake Superior, electric lights and street railway. Superior shares with Duluth the commercial advantage of being the extreme western port of the Great Lake system of the United States. It is an important shipping point for iron products, grain, flour, lard, cement, and lumber. Superior includes among its industries, shipbuilding, brewing, iron and steel works, foundries, boiler shops, lumber and flour mills, bag factories, coopering, chair, wagon and carriage making, lath, shingle and other lumber products. There are in all some 200 factories. Superior has many notable structures, including a federal building, municipal building, State Normal School, Finnish University, large hospitals, and public high and graded school edifices. The site of Superior was a station of the Hudson Bay company and an Indian trading-post. A town was laid out 1853, but little progress was made till 1885, when additional territory was acquired and a new city plotted with special considerations for its growth as a great commercial and shipping point, a large tract of land on the water front being reserved for railway and storage purposes. A city charter was granted 1889, and 1895 the entire area was divided into 9 wards, while the areas of the former towns continued to bear their old names as local distinctions. Pop. (1910) 40,384.

SUPERIOR, *sū-pē'rĭ-ēr*, LAKE: largest body of fresh water in the world; near the centre of N. America, highest and most western of the great lakes between w. Canada and the United States. Its general form is nearly semi-lunar, the outer curve toward the n.; greatest length e. to w., 355 m.; greatest breadth, 160 m.; about 32,000 sq. m. The surface is about 600 ft. above sea-level, mean depth 1,000 ft., so that its bottom is 400 ft. below sea-level. Its surface has an elevation of about 22 ft. above that of Lake Huron and Lake Michigan: the greater portion of this rise is at the Sault Ste. Marie, a strong rapid about a mile in length, at the opening of its outlet through the river St. Mary or St. Mary's Strait (q.v.), which transmits the waters of Lake S. to Lake Huron. The Sault Ste. Marie, the only obstacle to navigation between Lake Huron and Lake S., is overcome by a canal on the American side, about a mile in length, with two locks. This is one of the finest canals in the world. The sides and bottom are lined with stone throughout its whole length, the locks are admirably contrived, and the largest ships can pass through it with ease. The trade is increasing rapidly: see SHIPPING. Another canal of large size is in construction on the British side. The boundary between the United States and Canada starting from the outlet of the lake at the Sault Ste. Marie, sweeps toward the n., so as to include in the United States even the Isle Royale only 13 m. from the British coast, and strikes inland from the mouth of Pigeon or Arrow river, on the n.w. shore.

Lake S., being very near the watershed between Hudson's Bay and the Mississippi, receives no important rivers, though hundreds of streams pour themselves into it. The largest are the St. Louis river (about 110 m. long) which enters its w. extremity at Fond du Lac; and the Neepigon river, on the n. side, which with Lake Neepigon has a length of about 200 m. A small lake near the head of the Albany river, whose waters flow to Hudson's Bay, is only four m. from a bay opposite the State Islands on the n. shore, forming a route with little portage, which has long been used by the Hudson's Bay Company, for conveyance of goods from Lake S. to the country northward. The promontory, Kee-wee-naw, near the middle of the s. side, projects far into the lake. The islands are not numerous, the largest being Isle Royale, 44 m. long.

The water of Lake S. is remarkable for coldness, purity, and transparency, though the affluents on both sides are either turbulent, or deeply colored by vegetable matter from swamps and forests. A rise or fall in the level of the water, amounting to several inches in a few hours, is frequently observed along the shore, and has been supposed due to a regular tide, but is caused probably by the wind. Fresh water being more easily moved by the wind than salt water, great waves arise in Lake S. with wonderful rapidity; and even in summer, large steamers are often compelled to take shelter in some bay, or under the lee of an island. The low temperature of the water, compared with that of the air, in summer, makes fogs prevalent,

resting on the water at night, and vanishing an hour or two after sunrise. Lake S. never freezes over, but the bays are sealed up in winter, and a rim of ice extends to some distance all around the shore.

The country around Lake S. is generally bold and hilly, except the peninsula between it and Lake Michigan; but few of the hills rise more than 1,000 ft. above the lake, and most of them far less. On the s. shore, 100 m. w. of the Sault Ste. Marie, are the Pictured Rocks, cliffs of gray and red sandstone 100 to 200 ft. high, in many places presenting fantastic forms, and marked by numerous perpendicular stripes of red and yellow, from ferruginous waters trickling down the face of the rock.—The rocks around the lake are very ancient, belonging principally to the Laurentian and Huronian systems of the Azoic series, overlaid in some places, especially on the s. side, with patches of the Lower Silurian. The prevalent Laurentian rock is orthoclase gneiss. Among the Huronian rocks are greenstones, slates, conglomerates, quartzites, and limestones. The Lower Silurian rocks are soft sandstones. There is everywhere much evidence of glacial action. The Huronian rocks are stored with useful minerals. The copper and iron mines of the s. side are famed for extent and richness; and there is reason to estimate the mineral resources of the British side equal to those of the American, though as yet comparatively undeveloped. The richest copper-mines are near Kee-wee-naw point. The metal occurs principally native, and sometimes in single masses of great size. One was found 1853, about 40 ft. in length, computed at about 400 tons. Native silver is found associated with the native copper, sometimes intimately mixed with it. A rich vein in an islet in Thunder Bay (British side) yielded in one year silver to the value of $1,230,000. Gold has been found in small specks at Nan ainse on the British side. Lead ore occurs in some places. The beds of hæmatite, or red iron ore, at Marquette, on the s. side, are of wonderful extent: the ore is conveyed by railway to the harbor, thence by vessels to Cleveland, on Lake Erie, and thence by rail to Pittsburgh, where it is smelted.

The fisheries are important. The delicious whitefish and the gray trout abound, as well as other kinds of fish.

The n. shores of Lake S. are frequented by bands of the Ojibbeway tribe of aborigines: they are of very pure blood, retain in great measure their primitive habits, and many of them are still pagans. The white population of the Brit. shore consists chiefly of the fishermen and explorers who visit the region in summer; and of miners who extract the silver ore from veins, the richest yet discovered, on Silver Island, near Thunder Bay. On the American shore, large and prosperous towns have sprung up: Duluth, Minn., at the s.w. corner of the lake, Marquette and Houghton, in Mich., and Superior, Wis., all have grown with great rapidity. The Canadian Pacific railway, along the n. shore, connects that district with the rest of the Dominion. In 1886 the Canadian govt. subsidized the Thunder Bay Colonization railway.

SUPERLATIVE, a. *sū-pĕr'lă-tĭv* [F. *superlatif*—from mid. L *superlatīvus*, in *gram.*, superlative—from L. *super-lātus*, excessive—from *super*, above; *lātus*, carried, used as pp. of *ferrĕ*, to carry: It. *superlativo*]: surpassing all others; most eminent; supreme; in *gram.*, expressing the highest degree in the quality of adjectives or adverbs: N. that which is supreme; in *gram.*, a word in the superlative degree. SUPER'LATIVELY, ad. *-lĭ*. SUPER'LATIVENESS, n. *-nĕs*, the state of being in the highest degree.

SUPERLUNAR, a. *sū'pĕr-lō'nĕr* [L. *super*, above, and *lunar*]: being above the moon; not earthly.

SUPERMOLECULE, n. *sū-pĕr-mŏl'ĕ-kūl:* compounded molecule.

SUPERMUNDANE, a. *sū'pĕr-mŭn'dān* [L. *super*, above, and *mundane*]: above the world.

SUPERNACULUM, n. *sū'pĕr-năk'ū-lŭm*, or SUPERNAG'ULUM, n. *-năg'ū-lŭm* [a supposed corruption of L. *super un'gŭlam*, on the nail—from *super*, on or above; *un'gŭla* or *unguis*, a nail]: in *old drinking habits*, emptying the cup to the very dregs, so that there is not enough left to wet the nail of the hand; good liquor, such as would induce one to drink to the dregs: AD. to the last drop; entirely. SUPERNAC'ULAR, a. *-ū-lĕr*, very good, as liquor.

SUPERNAL, a. *sū-pĕr'năl* [L. *supernus*, on high, celestial—from *super*, above]: relating to things above; being in or belonging to a higher place or region; celestial. SUPER'NALLY, ad. *-lĭ*.

SUPERNATANT, a. *sū'pĕr-nā'tănt* [L. *super*, above; *natans* or *natan'tem*, swimming, *natārĕ*, to swim]: floating or swimming on the surface, as oil or leaves. SU'PERNATA'TION, n. *-nă-tā'shŭn*, the act of swimming on the surface.

SUPERNATURAL, a. *sū'pĕr-năt'ū-răl* [L. *super*, above, and *natural*]: in *physical nature*, applied to the action of some power superior to nature and to man, as when effects are produced without causes which are usually required to produce them; exceeding the powers or laws of nature; miraculous. SU'PERNAT'URALLY, ad. *-lĭ*. SU'PERNAT'URALNESS, n. *-nĕs*, the state or quality of being supernatural. SU'PERNAT'URALISM, n. *-ĭzm*, the doctrine of a divine and supernatural agency in the performance of miracles; in *theol.*, the doctrine that the knowledge of God can only be obtained by revelation; the opposite of *rationalism*. SU'PERNAT'URALIST, n. *-ĭst*, one who holds the doctrine of supernaturalism.

SUPERNUMERARY, a. *sū'pĕr-nū'mĕr-ĕr-ĭ* [L. *super*, above; *numĕrus*, a number: F. *surnuméraire*]: exceeding a necessary or usual number; in excess of the number stated: N. a person beyond what is usually needed, or above the stated number: in a *theatre*, an inferior actor.

SUPERPHOSPHATE, n. *sū'pĕr-fŏs'fāt* [*super*, and *phosphate*]: a salt containing more acid and less base than the common phosphate (see PHOSPHORUS).

SUPERPHOS'PHATE OF LIME: acid phosphate or hydric dicalcic orthophosphate; a fertilizer containing a large proportion of soluble phosphoric acid (see PHOSPHORUS: PHOSPHATES). It is made from bones (in the form of bone meal, bone black, or bone ash), phosphate guano, or Phosphate Rock (q.v.) treated with sulphuric acid. The use of bones from which the organic matter has not been wholly removed, by burning or steaming, increases the difficulty of manufacture, but the nitrogen which it contains adds somewhat to the value of the product. For purposes requiring considerable organic matter, some makers add nitrogenous substances and sell the material as 'ammoniated,' or 'nitrogenized' superphosphate; but many farmers prefer to buy the plain S. and apply nitrogenous fertilizers separately to the land. The growing scarcity of bones and relative cheapness of phosphate rock has led to the extensive use of the rock; though as it varies greatly in quality it has sometimes been found necessary to use part bone-black in order to bring the material to the required standard. The making of a really good S. requires considerable labor, care, and skill. Proportions vary somewhat, but for 1,000 lbs. of ground rock or bone about 500 to 600 lbs. of sulphuric acid, diluted with an equal volume of water, will be required: these materials must be so thoroughly mixed that every particle of the rock or bone shall be acted on by the acid. The addition of the acid does not increase the quantity of plant food which the other material contained. On the contrary, it converts quite a proportion of the material into sulphate of lime (gypsum) which is of comparatively low value. But by this conversion a partial separation of the lime and the phosphatic acid is effected, the latter becomes more readily soluble in water and, consequently, is made almost immediately available for the use of plants, thus giving them an early start and promoting their growth. The proportion of soluble phosphoric acid in a fair grade of S. ranges from 10 to 20 per cent. and in a high grade has reached 39 per cent. These grades contain also 1 to 7 per cent. of phosphoric acid in a comparatively insoluble condition, and in most superphosphates a proportion (usually small) of the acid which had been made soluble 'reverts' to a state approximating that in which it first appeared. What is called 'pure' S., containing 60 to 80 per cent. of soluble phosphoric acid, is made in small quantities. The great superiority of S. over ground bones or pulverized phosphate rock, is in its separation into much more minute particles, which can be more quickly appropriated by plants; and—on account of its being easily dissolved by rain—its much more uniform distribution throughout the soil. Soon after being carried into the ground the phosphoric acid not used by plants is precipitated by the action of lime, iron, or alumina in the soil, and forms phosphates of these substances; but it is in much smaller particles than it would have been if the original materials had been merely pulverized, and is far more readily acted on by water and by the roots of plants

than it could have been if they had not been treated with sulphuric acid. S. should be applied a short time before the seed is sown, in order that its acidity may be removed by contact with the soil. It is valuable not only for supplying plants with phosphoric acid, but also, through the aid of growing plants, for securing nitrogen from the air and liberating potash and other minerals in the soil. It varies greatly in its composition and no reliable estimate of its quality can be formed from its appearance. Its value can be determined only by chemical analysis. See PHOSPHATE ROCK.

SUPERPOSE, v. *sū'pĕr-pōz'* [F. *superposer*, to superpose—from L. *super*, above; *positus*, placed, pp. of *ponĕrĕ*, to place]: to lay or be placed upon; to lay upon, as one kind of rock upon another. SU'PERPO'SING, imp. SU'PERPOSED', pp. *-pōzd'* SU'PERPOSI'TION, n. *-pō-zĭsh'ŭn* [F.—L.]: a lying above or upon something; that which is situated above or upon something else; in *geol.*, the order of arrangement in which strata and formations are placed above each other.

SUPERPRAISE, v. *sū'pĕr-prāz* [L. *super*, above, and *praise*]: in *OE.*, to praise beyond measure.

SUPERROYAL, a. *sū'pĕr-roy'ăl* [L. *super*, above, and *royal*]: denoting a kind of paper in sheets larger than royal.

SUPERSALT, n. *sū'pĕr-sawlt* [L. *super*, above, and *salt*], a salt with a greater number of equivalents of acid than of base; acid salts.

SUPERSATURATE, v. *sū'pĕr-săt'ū-rāt* [L. *super*, above, and *saturate*]: to cause a liquid to dissolve an excessive quantity of a substance, such excess being held in very unstable solution.

SUPERSCRIBE, v. *sū'pĕr-skrīb'* [L. *super*, above; *scrĭbo*, I write]: to write or engrave on the top, outside, or surface; to write a name or address on the outside of a letter. SU'PERSCRI'BING, imp. SU'PERSCRIBED', pp. *-skrībd'*. SU'PERSCRIP'TION, n. *-skrĭp'shŭn* [L. *scriptus*, written], the act of superscribing; that which is written or engraved on the outside or over something else; the address of a letter; an impression of letters on coins.

SUPERSEDE, v. *sū'pĕr-sēd'* [L. *super*, above; *sedĕō*, I sit]: to set aside; to make void or useless by superior power; to render unnecessary, to suspend; to overrule; to come or be set in the place of another. SU'PERSE'DING, imp. SU'PERSE'DED, pp. rendered unnecessary; displaced, suspended SU'PERSE'DEAS, n. *-sē'dĕ-ăs* [L. set aside, stay]: in *law*, an order to suspend the powers of an officer in certain cases, or to stay proceedings. SU'PERSE'DURE, n. *-dūr*, the act of superseding; supersession.

SUPERSENSIBLE, a. *sū'pĕr-sĕn'sĭ-bl* [L. *super*, above, and *sensible*]: beyond the reach of the senses or natural powers of perception: also SU'PERSEN'SUAL, a. [*super*, and *sensual*]: above the senses.

SUPERSESSION, n. *sū'pĕr-sĕsh'ŭn* [L. *super*, above, and *session*]: the act of sitting on anything; the act of superseding.

SUPERSTITION, n. *sū'pĕr-stĭsh'ŭn* [F *superstition*—from L. *superstitĭō* or *superstitĭōnem*, the remaining in the old obsolete belief, unreasonable religious belief—from *super*, above; *sto*, I stand]: unfounded wonder at, or dread of, the divine or supernatural; that form of religion in which fear is stronger than love and trust; excess of scruples or extravagance in religion; the belief of what is absurd or without evidence, as in the direct agency of superior or supernatural powers in certain events; belief in omens and prognostics; a false religion; false worship. SU'PERSTI'TIOUS, a. *-ŭs* [F. *superstitieux*—L.]: manifesting belief in supernatural agencies in certain events; full of idle fancies and practices in regard to religion and the unseen world; scrupulous to excess. SU PERSTI'TIOUSLY, ad. *-lĭ*. SU'PERSTI'TIOUSNESS, n. *-nĕs*, the state or quality of being superstitious.

SUPERSTRATUM, n. *sū'pĕr-strā'tŭm* [L. *super*, above, and *stratum*]: a layer above another, or overlying something else.

SUPERSTRUCTURE, n. *sū'pĕr-strŭk'tūr* [L. *super*, above, and *structure*]: any edifice or erection built upon something else; that which is raised or built on a foundation or basis. SU'PERSTRUC'TION, n. *-shŭn*, the act of building on; a superstructure. SU'PERSTRUC'TIVE, a. *-tĭv*, built on something else

SUPERSUBSTANTIAL, a. *sū'pĕr-sŭb-stăn'shăl* [L. *super*, above, and *substantial*]: beyond the domain of matter; more than substance.

SUPERSUBTLE, a. *sū'pĕr-sŭt'tl* [L. *super*, above, and *subtle*]: in *OE.*, oversubtle; subtle in excess.

SUPERTEMPORAL, a. *sū'pĕr-tĕm'pō-răl* [L. *super*, above, and *temporal*]: that transcends time.

SUPERTERRESTRIAL, a. *sū'pĕr-tĕr-rĕs'trĭ-ăl* [L. *super*, above, and *terrestrial*]: being above the earth, or above what belongs to the earth.

SUPERTONIC, n. *sū'pĕr-tŏn'ĭk* [L. *super*, above, and *tonic*]: in *music*, the note, in the diatonic scale, next above the key-note, and forming with it the interval of the second, as D in the key of C major.

SUPERTRAGICAL, a. *sū'pĕr-trăj'ĭ-kăl* [L. *super*, above, and *tragical*]: tragical to excess.

SUPERTUBERATION, n. *sū'pĕr-tū'bĕr-ā'shŭn* [L. *super*, over, above; *tūber*, a hump or excrescence]: in *bot.*, the growth of young potatoes from old ones still growing.

SUPERVENE, v. *sū'pĕr-vēn'* [L. *super*, above; *venĭō*, I come]: to come upon, as something extraneous; to happen to. SU'PERVE'NING, imp.: ADJ. coming as an extraneous addition. SU'PERVENED', pp. *-vēnd'*. SU'PERVE'NIENT, a. *-vē'nĭ-ĕnt*, coming upon, as something additional. SU'PERVEN'TION, a. *-vĕn'shŭn*, the act of coming upon as something extraneous.

SUPERVISE, v. *sū'pĕr-vīz'* [L. *super*, above; *vĭsĕrĕ*, to survey—from *vidērĕ*, to see]: to oversee; to inspect; to superintend; in *OE.*, to read over; to peruse. SU'PERVI'SING, imp. SU'PERVISED', pp. *-vīzd'*. SU'PERVI'SAL, n. *-vī'zăl*, or SU'PERVI'SION, n. *-vĭzh'ŭn*, the act of overseeing; inspection. SU'PERVI'SOR, n. *-vī'zĕr*, an overseer; an inspector; a superintendent. SU'PERVI'SORY, a. *-zĕr-ĭ*, pertaining to or having supervision.

SUPERVOLUTE, a. *sū'pĕr-vō-lūt'* [L. *super*, above, and *volute*]: in *bot.*, having a plaited and rolled arrangement in the bud.

SUPINE, n. *sū'pīn* [L. *supīnus*, bent or thrown backward: It. *supino:* F. *supin*]: in *L. gram.*, an indeclinable part of the verb ending in *um* and *u*, and translated in English with 'to'—why it is so called is not very evident; an indeclinable verbal noun.

SUPINE, a. *sū-pīn'* [L. *supīnus*, bent or thrown backward, lying on the back, careless]: lying on the back, or with face upward; careless; thoughtless; negligent; inattentive; indolent. SUPINE'LY, ad. *-lĭ*. SUPINE'NESS, n. *-nĕs*, indolence; thoughtlessness. SUPINATE, a. *sū'pī-nāt*, in *bot.*, leaning or inclining with exposure to the sun. SU'PINA'TION, n. *-nā'shŭn*, the act of turning the face upward. SU'PINA'TOR, n. *-tĕr*, in *anat.*, one of those muscles which turn the palm of the hand forward or upward.—SYN. of 'supine': careless; heedless; listless; drowsy.

SUPPAWN', or SUPAWN: see SEPAWN.

SUPPED, SUPPER, SUPPERLESS, SUPPING: see under SUP.

SUPPLANT, v. *sŭp-plănt'* [F. *supplanter*, to supplant—from L *supplantārĕ*, to trip up the heels, to overthrow—from *sub*, under; *planta*, the sole of the foot: It. *supplantare*]: to trip up the heels; hence, to take the place of, as by stratagem or unfair means; to displace; to force away; to supersede. SUPPLANT'ING, imp.: N. the act of displacing or turning out. SUPPLANT'ED, pp. SUPPLANT'ER, n. *-ĕr*, one who supplants.—SYN. of 'supplant': to overpower; remove: supersede; undermine; overthrow.

SUPPLE, a. *sŭp'pl* [F. *souple*, supple—from L. *supplex*, folding or bending the knees beneath one, a suppliant—from *sub*, under; *plĭco*, I bend or fold]: easily bent; flexible; that makes pliant; compliant; not obstinate; flattering or fawning: V. to make pliant or flexible; to train; to grow soft or pliant. SUP'PLING, imp. *-plĭng*. SUPPLED, pp. *sŭp'pld*. SUP'PLELY, ad. *-pl-lĭ*. SUP'PLENESS, n. *-nĕs*, quality of being easily bent; readiness of compliance.—SYN. of 'supple, a.': pliant; yielding; bending; flattering; soft; facile.

SUP'PLE JACK: name given in the s. United States to *Berchemia volubilis*, twining shrub of nat. order *Rhamnaceæ*, found as far n. as Virginia. It has oval leaves, small flowers, and violet-colored berries. It abounds in the Dismal Swamp and similar situations, and ascends to the tops of the highest trees. The genus *Berchemia* contains

a number of species of twining shrubs, natives of warm climates in different parts of the world.—The name S. J. is given in the W. Indies and tropical America to *Serjania* (or *Seriana*) *triternata*, shrub of nat. order *Sapindaceæ*, with long, flexile, woody stem, which climbs to the tops of the highest trees, and is used for walking-sticks. It has poisonous properties, and is employed for stupefying fish.

SUPPLEMENT, n. *sŭp'plĕ-mĕnt* [F. *supplément*—from L. *supplemen'tum*, that with which anything is made full or whole—from *sub*, under; *plĕō*, I fill: It. *supplemento*, a supplement]: any addition by which defects are supplied, an addition made to a published work or book to render it more complete; an additional sheet to a newspaper; in *trig.*, the quantity by which an arc or an angle falls short of 180 degrees, or a semicircle; what must be added to an arc to make a semicircle: V. *sŭp'plĕ-mĕnt'*, to add something to make more full and complete; to add to. SUP'PLEMENT'ING, imp. SUP'PLEMENT'ED, pp. SUP'PLEMENT'AL, a. *-ăl*, added to supply deficiencies or defects; additional: also SUP'PLEMENT'ARY, a. *-ĕr-ĭ*. SUP'PLEMENT'ALLY, ad. *-lĭ*. SUPPLETORY, a. *sŭp'lĕ-tĕr-ĭ*, or SUP'PLETIVE, a. *-tĭv*, supplying deficiencies.

SUPPLIANCE, n. *sŭp-plī'ăns* [from SUPPLY]: in *OE.*, continuance. SUPPLIANT, a. *sŭp-plī'ănt* in *OE.*, furnishing a supply.

SUPPLIANCE, n. *sŭp'plĭ-ăns:* see under SUPPLIANT.

SUPPLIANT, a. *sŭp'plĭ-ănt* [F. *suppliant*, a humble petitioner—from L. *supplicans* or *supplican'tem*, beseeching; *supplĭcārĕ*, to beseech—from *sub*, under; *plico*, I fold], asking earnestly and submissively; expressive of humble supplication; entreating: N. one who entreats humbly and submissively. SUP'PLIANCE, n. *-ăns*, entreaty; supplication. SUP'PLIANTLY, ad. *-lĭ*. SUP'PLICANT, a. *-kănt*, entreating; asking submissively: N. one who entreats submissively; a petitioner who asks earnestly. SUP'PLICATE, v. *-kāt*, to seek by earnest prayer; to beseech; to entreat. SUP'PLICATING, imp. entreating; imploring. SUP'PLICATED, pp. SUP'PLICATINGLY, ad. *-lĭ*. SUP'PLICA'TION, n. *-kā'shŭn* [F.—L.]: a humble and earnest prayer in worship; an earnest entreaty. SUP'PLICATORY, a. *-kā-tĕr-ĭ*, petitionary; humble; submissive.—SYN. of 'suppliant, a.': beseeching; suing; begging; imploring;—of 'supplicate': to ask; beg; petition; importune; solicit; crave; implore, request; adjure.

SUPPLY, v. *sŭp-plī* [L. *supplĕrĕ*, to make full or whole—from *sub*, under; *plĕō*, I fill: F. *suppléer:* It. *supplire*]: to fill as deficiencies happen; to give or afford what is wanted; to serve instead of; to provide; to bring or furnish; to fill vacant room: N. sufficiency of things for use or want; in *Brit. parliament*, taxes, customs, etc.; necessary stores and provisions; relief of want; stock. SUPPLY'ING, imp. SUPPLIED', pp. *-plīd'*. SUPPLIES', n. plu. *-plīz'*, things supplied in sufficiency; the sums of money granted by parliament to meet the public expenditure; ways and means (see

SUPPLY, COMMITTEE OF). SUPPLI'ER, n. *-plī'ĕr*, one who supplies SUPPLY'MENT, n. in *OE.*, prevention of deficiency. COMMISSIONERS OF SUPPLY, in *Scotland*, persons appointed by the acts imposing the land-tax to assess that tax: see VALUATIONS OF LAND: LAND-TAX. DEMAND AND SUPPLY, two important terms in political economy, the former denoting a deficiency in some article of commerce in a market, and the latter the furnishing of the article wanted.—SYN. of 'supply, v.': to provide; furnish; minister; administer; contribute; accommodate; yield; fill: afford.

SUPPLY, COMMITTEE OF: in the British house of commons, a committee of the whole, relative to the *supplies*, or sums to be granted to defray the public expenditure for the current year. All bills authorizing the expenditure of public money must originate in the house of commons, and be based on resolutions moved in a committee of supply. The house having resolved that a supply be granted to the sovereign, resolves itself into a committee of supply, to which the various estimates are submitted: this committee considers what specific grants are to be voted; and its resolutions are reported to the house, and adopted or rejected. It devolves on another committee of the house, the 'committee of ways and means,' to consider how the sums shall be raised which are voted by the committee of supply: see WAYS AND MEANS: PARLIAMENT.

SUPPORT, v. *sŭp-pōrt'* [F. *supporter*, to support—from L. *supportārĕ*, to carry or bring to a place—from *sub*, under; *porto*, I carry: It. *sopportare*]: to bear or hold up; to endure without being overcome; to undergo; to sustain; to vindicate; to prop; to maintain; to strengthen; to keep from fainting or sinking; to help; to supply with necessary funds; to substantiate; to represent, as an actor any character: N. sustaining power; the necessaries of life; food; that which upholds a person or thing from falling or sinking; assistance; aid; help; basis; the act or vindicating or maintaining. SUPPORT'ING, imp. SUPPORT'ED, pp. SUPPORT'ER, n. *-ĕr*, one who gives aid or help; a defender; an adherent; that which supports; in *her.* (see SUPPORTERS). SUPPORT'ABLE, a. *-ă-bl* [F.—L.] that may be upheld, sustained, or endured; bearable. SUPPORT'ABLY, ad. *-ă-blĭ*. SUPPORT'ABLENESS, n. *-bl-nĕs*, the state of being supportable. SUPPORT'ANCE, n. *-ăns*, in *OE.* maintenance; support. SUPPORT'LESS, a. *-lĕs*, without support. POINTS OF SUPPORT, the collected areas, on the plan of any structure, of the piers, walls, columns, and the like, upon which it is to rest. RIGHT OF SUPPORT, in *law*, a servitude by which an owner of a house has a right to rest his timbers on the walls of his neighbor's house.—SYN. of 'support, v.': to endure; verify; countenance; patronize; back; second; aid; succor; relieve; uphold; favor; nurture; encourage; shield; cherish; nourish; defend; protect; stay; forward; assist; sanction;—of 'support, n.': food; nutriment; sustenance; livelihood; aid; succor; maintenance; countenance; encouragement.

SUPPORTERS, in Heraldry: figures placed on each side of an armorial shield, as it were to support it. They seem to have been, in their origin, a purely decorative invention of mediæval seal-engravers, often, however, bearing allusion to the arms or descent of the bearer; but in the course of time, their use came to be regulated by authority, and they were considered indicative that the bearer was the head of a family of eminence or distinction. The usual S. are animals, real or fabulous; but men in armor are frequent, and Savages (q.v.), or naked men, often represented with clubs, and wreathed about the head and middle. There are rare instances of inanimate S. On early seals, a single supporter is frequent, and particularly in placing the escutcheon on the breast of an eagle displayed.

In England, the privilege of bearing S. as now defined belongs to the sovereign and princes of the blood, peers and peeresses, and the heads of a very few families not of the peerage, whose right is based on an ancient patent, or very early usage. Knights of the Garter and knights grand cross of the Bath are dignified with S., which, however, are not hereditary; and S. have been assigned to the principal mercantile companies of London. In Scotland, the use of S. is less restricted.

The lion and unicorn, familiar in the royal arms of the United Kingdom, were adopted, the former from the achievement of England, the latter from that of Scotland prior to the union of the crowns.

SUPPOSE, v. *sŭp-pōz'* [F. *supposer*, to suppose—from L. *supposĭtus* placed under, substituted falsely—from *sub* under; *posĭtus*, pp. of *ponĕrĕ*, to place]: to lay down, assume, or admit without proof; to imagine; to receive as true without examination; to require to be true; to surmise. N. in *OE.*, position without proof; supposition. SUPPO'SING, imp. SUPPOSED', pp. *-pōzd':* ADJ. laid down or imagined as true; believed. SUPPO'SAL, a. *-pō'zăl*, in *OE.*, position without proof; opinion. SUPPO'SER, n. *-zĕr*, one who supposes. SUPPO'SABLE, a. *-zā-bl* [F.—L.]: that may be imagined to exist. SUPPOSITION, n. *sŭp'pō-zĭsh'ŭn* [F.—L.]: the act of laying down, or admitting as true or existing, what has not been proved; belief without evidence, imagination; conjecture; hypothesis; in *music*, the transient use of discords followed by concords. SUP'POSI'TIONAL, a. *-ăl*, assumed without proof; conjectural. SUP'POSI'TIONALLY, ad. *-lĭ*. SUPPOS'ITIVE, a. *-ĭ-tĭv*, including or implying supposition: N. in *gram.*, a word implying supposition. SUPPOS'ITIVELY, ad. *-lĭ*.—SYN. of 'suppose, v.': to imagine; believe; conclude; consider; judge; view; assume; conjecture; apprehend; conceive; guess; involve; imply; presume.

SUPPOSITITIOUS, a. *sŭp-pŏz'ĭ-tĭsh'ŭs* [L. *supposĭtĭt'ĭus*, put in the place of another—from *sub*, under; *posĭtus*, placed; *ponĕrĕ*, to place]: put by trick in the place belonging to another; not genuine; spurious. SUPPOS'ITI'TIOUSLY, ad. *-lĭ*. SUPPOS'ITI'TIOUSNESS, n. *nĕs*, the state of being suppositititious.

SUPPOSITIVE. See under SUPPOSE.

SUPPOSITORY, n. *sŭp-pŏz'ĭ-tōr-ĭ* [L. *suppositus,* placed under—from *sub,* under; *pōnō,* I place]: a solid medicinal agent for introduction into the rectum.

SUPPRESS, v. *sŭp-prĕs'* [L. *suppressus,* held or kept back—from *sub,* under; *pressus,* pressed; *premĕrĕ,* to press]: to put down; to overpower and crush; to restrain; to keep in; not to tell or reveal; to stop; to stifle; to conceal. SUPPRES'SING, imp. SUPPRESSED', pp. *-prĕst':* ADJ. crushed; concealed; stopped. SUPPRES'SIBLE, a. *-sĭ-bl,* that can be suppressed or concealed. SUPPRES'SOR, n. *-sėr,* one who suppresses. SUPPRES'SION, n. *-prĕsh'ŭn* [F.—L.]: the act of crushing or destroying; the act of holding back or retaining; concealment; stoppage; in *gram.,* the omission, as of words; in *bot.,* the complete non-development of organs; in *med.,* arrest of a normal secretion (see RETENTION OF URINE). SUPPRES'SIVE, a. *-prĕs'sĭv,* that tends to suppress.—SYN. of 'suppress': to restrain; put down; overpower; overwhelm; smother; destroy; conceal; detain; retain; obstruct; subdue.

SUPPRES'SION OF VICE. See VICE, SOCIETIES FOR THE SUPPRESSION OF.

SUPPURATE, v. *sŭp'pū-rāt* [L. *suppūrātus,* pp. of *suppūrārĕ,* to gather matter underneath—from *sub,* under; *pus,* the white and viscous matter of a sore; *pūris,* of matter: It. *suppurare:* F. *suppurer*]: to generate or form white and viscous matter (Pus, q.v.), as in a sore; to cause to form matter, as a sore. SUP'PURATING, imp.: ADJ. secreting pus. SUP'PURATED, pp. SUP'PURA'TION, n. *-rā'shŭn* [F.—L.]: process of producing pus, as in a sore; the matter formed in a sore (see below). SUP'PURATIVE, a. *-tĭv,* tending to suppurate: N. medicine that promotes the forming of pus, as in a sore.

SUPPURA'TION: the formation of pus, which is one of the commonest products of inflammation. The opinion formerly universal was, that pus was formed from excessive exudation of the fluid portions of the blood through the walls of the capillaries; in which exudation, under certain conditions, pus-cells were developed. This view was for a time replaced by the theory that the corpuscles in pus were derived from connective-tissue cells; but now it is again generally held that exudation of white blood corpuscles is responsible for most if not all the pus-cells.

Although suppuration is a morbid process, it often accompanies processes of beneficial tendency (such as granulation), and frequently takes the place of other far more morbid processes. It further affords a mechanical means of removing foreign bodies, e.g., thorns, splinters of glass, etc., from soft parts into which they may have been driven.

SUPRA-. *sū'prā* [L. *supra,* above, beyond]: a Latin prefix signifying 'above; on the top; over; beyond.'

SUPRA-AXILLARY, a. *sū'prā-ăk'sĭl-lĕr-ĭ* [L. *supra,* and *axillary*]: in *bot.,* growing above the axil.

SUPRACRETACEOUS, a. *sū'prā-krē-tā'shŭs* [L. *supra,* upper, and *cretaceous*]: in *geol.,* applied to deposits lying over the chalk formation.

SUPRAFOLIACEOUS, a. *sū'prā-fō'lĭ-ā'shŭs* [L. *supra,* upper, and *foliaceous*]: in *bot.,* inserted above a leaf or petiole.

SUPRALAPSARIAN, n. *sū'prā-lăp-sā'rĭ-ăn* [L. *supra,* beyond; *lapsus,* a falling down or into ruins; *labor,* I fall down]: in *theol.,* one who holds that God's absolute decree of election and reprobation is antecedent to his foresight of the fall of Adam, and irrespective of it. See SUBLAPSARIAN: ADJ. pertaining to.

SUPRAMUNDANE, a. *sū'prā-mŭn'dān:* situated above the world, or above our system.

SUPRANATURALISTS, n. plu. *sū'prā-năt'ū-răl-ĭsts* [L. *supra,* upper, above, and *naturalists*]: in *theol.,* those who believe in supernatural manifestations in religion and in a divine revelation, in opposition to the rationalists, who exclude them; also those who adopt the system of accommodation in religious matters, and explain away tenets usually considered fundamental. See also under SUPERNATURAL.

SUPRAORBITAL, a. *sū'prā-ŏr'bĭ-tăl* [L. *supra,* upper, and *orbital*]: in *anat.,* above the orbit of the eye.

SUPRARENAL, a. *sū'prā-rē'năl* [L. *supra,* upper, and *renal*]: in *anat.,* situated above the kidneys.

SUPRARE'NAL CAP'SULES: two small, flattened glandular bodies of yellowish color, one directly in front of the upper end of each kidney In weight they vary from one to two drachms. They belong to the class of ductless glands, and on making a perpendicular section, each gland is seen (like the kidney) to consist of cortical and medullary substance. The blood-vessels and nerves of the glands are exceedingly numerous.

Diseases of the Suprarenal Capsules.—Attention has been drawn to the diseases of these organs from the observation of Dr. Addison (of Guy's Hospital), that such cases are frequently associated with deposition of pigment in the skin, causing it to assume a deep bronze color. *Addison's Disease,* or *Suprarenal Melasma,* or *Bronzed Skin Disease,* is a chronic affection, whose characteristic features are anæmia, general languor and debility, and extreme prostration, expressed by loss of muscular power, weakness of pulse, feebleness of the heart's action, breathlessness upon slight exertion, dimness of sight, functional weakness and irritability of the stomach, and a peculiar uniform discoloration of the skin, which becomes of a brownish olive-green hue, like that of a mulatto. Then symptoms occur in connection with a certain diseased condition of the suprarenal capsules. The progress of the disease is very slow, extending on

an average over one year and a half, but may be prolonged over four or five. The tendency to death is by heart failure. The numerous cases recorded by different physicians of all countries since Dr. Addison's original observations were made, show that the connection between *bronzing* of the skin and various morbid states of the suprarenal capsules is a fact beyond dispute. These symptoms are directly dependent upon disease, degeneration, or atrophy of the suprarenal capsules. This is shown by post-mortem examination of persons dying with Addison's disease, and also by the fact that the symptoms are relieved by the administration of suprarenal extract or adrenalin. Their secretion, which is taken into the blood directly and not first discharged from the gland through ducts (therefore called an 'internal secretion'), possesses the property of causing contraction of the minute blood vessels and so increasing the blood pressure. When an extract made from the gland is applied to the surface of a mucous membrane, it causes a blanching of the surface in consequence of the contraction of the blood vessels. This enables slight operations (within the usual cavity, for example) to be performed without the loss of blood. The secretion also has an important function in controlling metabolism or the nutritive processes in the tissues.

SUPRASCAPULAR, a. *sū'prā-skăp'ū-lėr* [L. *supra*, upper, and *scapular*]: in *anat.*, situated above the shoulder blade.

SUPREM'ACY, ROYAL: term in politics, applied chiefly to authority in matters ecclesiastical. From the time of Pope Gelasius (494) to the Reformation, the pope exercised over all the churches of w. Europe a very extensive authority, judicial, legislative, and executive, undefined in its limits, varying in different countries and at different periods; which continues to be more or less recognized in all countries whose inhabitants are in communion with the Church of Rome. At the English Reformation, the papal supremacy was abolished, and act 26 Henry VIII. c. 1, declared the king and his successors the 'only supreme head on earth of the Church of England.' A curious document was at the same time drawn up by the govt., in which, to avoid misconception, it was explained that the recognition of this headship of the church implies only that the king should have such power as of right appertaineth to a king by the law of God, and that he should not take any spiritual power from spiritual ministers, or pretend to 'take any power from the successors of the apostles that was given them by God.' In 1535, the same year in which this act was passed, John Fisher, Bp. of Rochester, Sir Thomas More, and others, were beheaded for denying the king's supremacy (ecclesiastical): and 1578, John Nelson, a priest, and Sherwood, a young layman, suffered death for the same offense. The assumption by Henry VIII. of the

title 'Head of the Church,' notwithstanding the explanation alluded to, was much commented on; and on the accession of Elizabeth, it was thought prudent, while again claiming the supremacy in all cases, as well ecclesiastical as civil, to keep that designation in the background. By successive statutes, the requisitions concerning this oath and cognate oaths have been greatly modified. In the new short oath of allegiance (1871) the royal supremacy in matters ecclesiastical is not in express words specified: see ABJURATION, OATH OF.

SUPREME, a. *sū-prēm'* [F. *suprême*, highest—from L. *suprēmus*, highest, topmost—from *supĕrus*, high—from *super*, above: It. *supremo*]: highest; greatest; most excellent, holding the highest place in government or power; sovereign; pre-eminent. SUPREME'LY, ad. *-lĭ*. SUPREM'ACY, n. *-prĕm'ă-sĭ*, highest authority or power; sovereign and undivided authority in ecclesiastical affairs. OATH OF SUPREMACY, oath formerly taken by loyal British subjects denying the pope's supremacy and maintaining the royal prerogative in matters ecclesiastical as well as in things temporal—called the *royal supremacy:* see SUPREMACY, ROYAL.

SUPREME COURT OF THE UNITED STATES, THE· is a cardinal feature of our federal representative government, balancing and harmonizing all its parts, a tribunal which has received the general approval and admiration of foreign jurists and statesmen, and commands the universal respect and confidence of the people for whom it administers justice. The federal convention of 1787, which framed our constitution and created this unique tribunal, was composed mostly of members of the legal profession, which has always in America been the chief nursery of statesmen; but Washington, the soldier, presided, and Franklin, the philosopher, advised at every step.

It was to establish justice for the people of the United States that the federal judiciary, with the supreme court as its head, was created. It forms the balance wheel by which the affairs of the nation and its relation to the states are kept in working order, and is itself held in check by the power of the president to appoint its members as vacancies may occur, and by the power of congress to impeach them for misconduct, to regulate the measure of its appellate jurisdiction, and to increase or diminish its numbers The permanent stability of the judicial power is assured by its being imbedded in the constitution, with a jurisdiction co-ordinate with that of the executive and legislative departments, by the extreme difficulty in the way of any amendment that would impair it, and by the universal conviction which the experience of a century has produced, that its continued existence with the full enjoyment of its present functions is absolutely essential to the successful working of our scheme of popular representative government.

SUPREME COURT.

The absolute failure of the confederation was not without its lessons, and the aim of the makers of the new constitution was to create such a system of government that there would be neither doubt as to the powers of its component parts, or clash or friction in their duties, so it was provided that 'this constitution and the laws of the United States which shall be passed in pursuance thereof, and all treaties made under the authority of the United States, shall be the supreme law of the land, and the judges of every state shall be bound thereby, anything in the constitution or laws of any state to the contrary notwithstanding.' This making the federal constitution and treaties made, and laws of congress passed under its authority, the supreme law of the land is the key of our dual system of government, as the omnipotence of parliament is the key of the British constitution. But the federal government, though supreme within the limits prescribed, is not omnipotent; it must keep within those limits. By the 10th amendment, passed immediately after the adoption of the constitution, to prevent congress from meddling with the domestic concerns of the states, or exercising powers not granted to them, it was expressly provided that the powers not delegated to the United States by the constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people.

Thus the people of the United States created for themselves two separate and distinct governments, each 'of the people, by the people, and for the people,' each independent and exclusive of the other within its own scope and sphere, and each able, without aid from the other, to reach for its own purposes, by its own authority, every person and every foot of land within its territory. Complex as it may appear to people living under other forms of government, this dual system has worked very simply, smoothly, and harmoniously from the beginning until now, except for the single occasion when the terrible question of slavery proved to be too much for all the departments of government combined, and could only be settled by our long years of civil war. But how has this marvelous result been accomplished? How has it been possible for these two governments, each of prescribed and limited powers, and each department of both similarly defined, to act independently and at the same time harmoniously over the same people? The answer to these and to all possible questions of a similar nature that may arise, is found in the constitution and powers of the supreme court of the U. S.

The third article of the constitution establishing the U. S. courts, is marvelously brief and simple. The judges, according to that good old rule which has worked so well in England since the days of William and Mary, are to hold their offices during good behavior, and can only be removed by impeachment, and their compensation shall

not be diminished during their continuance in office. The supreme court has original jurisdiction only in cases affecting ambassadors, public ministers, and consuls, and in those in which a state shall be a party. The first branch of this original power has seldom been invoked, but over and over again a great state has been brought to its bar by another state to settle boundary disputes, always the most dangerous to the peace of adjoining states, and in each instance its decree has been submitted to with implicit obedience—a most unique judicial power, and a most convincing example to persuade all nations to settle these most perilous questions by arbitration. It has been well said 'that the provision that the judicial power created by the people shall be the arbiter between the states themselves, in all their controversies with each other, marks the highest level ever attained in the progress of representative government.' Tocqueville says: 'In the nations of Europe the courts of justice are only called upon to try the controversies of private individuals, but the supreme court of the U. S. summons sovereign powers to its bar.' John Stuart Mill declares it to be 'the first example of what is now one of the most prominent wants of civilized society, a real international tribunal.' In all other matters the jurisdiction of the supreme court is only appellate. The judicial power extends only to cases as they arise between party and party, and in the supreme court as they come to it mostly by appeal from the inferior federal courts, or by writ of error to the state courts.

The courts of the U. S. exercise no supervision over, or interference with, the president or congress, or the legislatures of the states. They have no veto power. They do not lie in wait for acts of congress, to strangle them at their birth. They have no jurisdiction to pronounce any statute, either of a state or of the U. S., void because irreconcilable with the constitution, except as they are called upon to adjudge the legal rights of litigants in actual controversies. They simply pass upon the rights of parties as they come before them, and if a provision of the constitution, or of a federal statute, or a treaty is invoked for or against a right claimed or denied, they interpret the constitution, the law, or the treaty, and determine the right. In this way, and in this way only if an act of congress or of a state legislature is claimed to be invalid, or an official act is claimed to be illegal under the constitution of the U. S., and the decision of that question is vital and necessary to determine the rights of the parties, they perform the ordinary duty of interpretation, and declare the validity or invalidity of the act, and so determine the right between the parties before them in that particular case, and for no other purpose, and this may happen months or years after the enactment of the statute.

The supreme court performs no duties except judicial

duties. So, when in 1794 President Washington requested the opinions of the judges on the construction of the treaty with France of 1778, they declined to comply, and when an early congress enacted that certain pension claims should be considered and passed upon by the federal courts, the supreme court upheld them in refusing to act under it, upon the ground that the power proposed to be conferred was not judicial power within the meaning of the constitution. Nor will the court give a hearing to a fictitious or collusive case, contrived to raise a question as to the validity of a statute. Keeping strictly within the limit prescribed to it of exercising only judicial power, the federal judiciary has steadily refrained from exercising any political power, which belongs exclusively to congress and the president, and so it has been brought into no collision with the other departments. It will not even indulge in discussions, or express opinions upon purely political questions. All attempts, for instance, to induce it to interfere either to restrain or compel the president in the exercise of his power to see that the laws are faithfully executed have failed. In the case of foreign nations, as well as in that of the sovereign states of the union, the government acknowledged by the president, or by the president and congress, is always recognized by the supreme court. In all such questions as are purely political it holds itself bound by the acts of the other departments. But, careful as the judges are to confine the exercise of the federal judicial power to cases as they arise, that power does extend to 'all cases of law and equity arising under the constitution, the laws of the U. S., and treaties made under their authority, to all cases affecting ambassadors, other public ministers and consuls, and to all cases of admiralty and maritime jurisdiction'; and whenever any such case does come before the supreme court it must take cognizance of it, and it cannot shrink, and never has shrunk, from determining the question of private right so arising. It is under these clauses that its unique and peculiar function of testing the validity of state laws and constitutions and of federal statutes, and the legality of the acts of state and federal officers arises.

The remainder of the federal judicial power depends wholly upon the character of the parties to the controversy. It extends 'to controversies to which the U. S. shall be a party.' This enables the federal courts to enforce the acts of congress, civil and criminal, against all persons within the realm; 'to controversies between two or more states,' the purpose of which was to make the supreme court the arbitrator and peacemaker between sovereign states; to 'controversies between a state and citizens of another state, between citizens of different states, between citizens of the same state claiming lands under grants of different states, and between a state, or the citizens thereof, and foreign states, citizens, or sub-

jects.' It was wisely concluded that in all such cases justice would be safer and surer, against state or local interest, prejudice or passion, in courts representing and vested with the authority of the whole nation, than in the courts of the state of an interested party, and that foreigners especially should have the right to have their causes heard and decided by national tribunals. These clauses, which make jurisdiction dependent upon the citizenship or character of the parties, have been a prolific source of litigation in the federal courts, have opened to them the entire field of law and equity; have extended their adjudications to the whole body of jurisprudence, and have given to the decisions of the supreme court, by reason of the weight and force of character of the court and its members, a commanding authority with the state courts, and persuasive influence with foreign tribunals. But in this department of its functions the supreme court does not differ, in the scope of its powers and duties, from the courts of last resort of other nations, and its distinctive and peculiar character is not involved. The power of the court to declare state and federal statutes, and the acts of the national and state executive officers invalid, as being in violation of the constitution of the U. S., naturally attracts the attention of foreign observers.

One of the most remarkable peculiarities of the constitution is its fitness to provide adequately for conditions that were not thought of in 1787. This is due first, to the wisdom of its framers, who inserted in it only fundamental rules and principles, generally and briefly expressed, leaving it always to congress to fill in and provide for all details; and secondly, to the vigorous and masterly manner in which the supreme court has exercised its essential and lawful functions of construction. By this it has applied the whole instrument and each of its parts to new conditions as they arose, and has developed and strongly asserted the inherent powers of sovereignty intended to be vested in the government of the U. S., and necessarily resulting from their existence as a nation. It was our happy fortune that for 34 years, in that critical period of our history which was to determine whether we were to be a great and powerful nation, adequate for all the needs of a first-class power in the world, or only a league of states like the old confederation, we had the benefit of the broad and robust intellect of Chief Justice Marshall, to enforce the liberal principles of construction which the genius of Hamilton had laid down.

In a single paragraph he states the whole theory upon which the court has administered the constitution, and fitted it to the growing wants and changing conditions of the nation:

The government is acknowledged by all to be one of enumerated powers. The principle that it can exercise only

the powers granted to it is now universally admitted. But the question respecting the extent of the powers actually granted is perpetually arising, and will probably continue to arise, as long as our system shall exist. The powers of the government are limited, and its powers are not to be transcended. But the sound construction of the Constitution must allow to the National Legislature that discretion with respect to the means by which the powers it confers are to be carried into execution, which will enable that body to perform the high duties assigned to it, in a manner most beneficial to the people. Let the end be legitimate, let it be within the scope of the Constitution, and all means which are appropriate, which are plainly adapted to that end, and which are not prohibited, but are consistent with the letter and spirit of the Constitution, are constitutional.

Hamilton, in the *Federalist*, declared that 'the judiciary is beyond comparison the weakest of the three departments of power; that it can never attack with success either of the other two; and that all possible care is requisite to enable it to defend itself against their attacks. Montesquieu, whose works, with Blackstone's, were the text-books of constitutional liberty which the framers had constantly in hand, declared that 'the judicial power is next to nothing.' And it was said by another French publicist, 'It has no guards, palaces, or treasures, no arms but truth and wisdom, and no splendor but the justice and publicity of its judgments.' But the Supreme Court, sustained generally by the confidence and affection of the people, has more than held its own. Keeping carefully within its own limits, it has for the most part labored to keep the other departments of government within theirs, and the powers of the States and of the nation from coming into conflict. In its hands the judicial power has been the force which has kept each member of our federal system in its proper orbit.

The closing scene in the Federal Convention, which made the Court in a way the guardian of the Constitution, will be ever memorable. After months of discussion, sometimes violent, more than once approaching the very brink of dissolution, in hopeless despair of coming to any agreement, at last the grand triumph of compromise and mutual concession was accomplished, and the members met to affix their names to the instrument. Hamilton, one of the yungest, acted as scribe, and after Washington had signed first as 'President and Deputy from Virginia, inscribed on the great sheet of parchment the name of each State, as the delegates came forward in geographical order to add their names. When all had signed, Franklin, pointing to the sun emblazoned behind the chair in which Washington had presided through the whole struggle, said to those about him, 'In the vicissitudes of hope and fear, I was not able to tell whether it was rising or setting. Now, I know that it is the rising sun.' After more than a century's trial of their work, the sun which Franklin saw is not yet near the zenith—much has been done, but vastly more remains to be accomplished.

SUR-, *sėr* [F. *sur*, on, upon—from L. *super*, upper, above]: a prefix signifying 'over; in addition; above; beyond:' sometimes merely intensive.

SUR-, prefix, *sėr* [L.]: form assumed by the prefix *sub* before words beginning with *r*, as *surreptitious*.

SURA, n. *sô'ra* [Ar.]: a chapter of the Koran.

SURABAYA, *sô-râ-bī'â*: leading seaport of Java, cap. of a Dutch residency; on the Kali Mâs mouth of the river Kediri, near the Strait of Madura, the citadel being in 7° 4′ 30″ s. lat. and 112° 40′ 40″ e. long. The European town is on the w. bank, five bridges connecting it with the Chinese and Javan quarters on the east. There are 2 Prot. clergymen, a Rom. Cath. priest and assistant, several govt. and adventure schools for Christian children. There are regular steamboat services to Samarang, Batavia, and other places. The govt. sugar culture in S. employs 6,000 families, and produces more than 30,000 tons per annum, The govt. coffee amounts to about 400 tons per annum. Pop. 118,770, 5,913 Europeans.

The *Residency* of S. comprises an extensive tract of fertile land in n.e. Java, and the island of Madura. Rice, coffee, sugar, indigo, cotton, tobacco, and cocoa-nuts are extensively cultivated. Pop. 2,074,362.

SURAH, n. *sôr'â* [native name]: kind of silk material.

SURAKARTA, *sô-râ-kâr'tâ*: Dutch residency of Java, s.e. from Samarang; 2,370 sq. m. It is fertile and well cultivated, producing rice, maize, sugar, coffee, tea, indigo, tobacco, pepper, cacao, vanilla, and tropical fruits. About 4,500 tons of coffee are produced yearly. The people are proud, and less obedient than in the other residencies, but abjectly submissive to the native regent, (sometimes called emperor), though, in many things connected with his govt., he must consult the European resident. Pop. 1,167,005.

SURAKAR'TA, or SOLO: city in Java, cap. of the native state, and seat of the Dutch residency; on the left bank of the Solo; 7° 31′ 30″ s. lat., and 110° 46′ 7″ e. long. It covers a large space. Many princes and nobles have their palaces in S.; that of the native regent is of great extent and splendor: 10,000 persons, belonging to or in the service of the royal family, are said to live within its wall. N.e. from the royal parks is the European town, in front of which, surrounded by the parade ground, and commanding the palace, is a square fort, with broad canal and drawbridges at the four curtains, and mounted with 30 pieces of heavy artillery. There is a normal school for training Javanese teachers, a govt. school, and an adventure girls' school. Pop. 101,495.

SURAL, a. *sū'răl* [L. *sūra*, the calf of the leg]: pertaining to the calf of the leg.

SURANCE, n. *sū'răns* [see SURE]: in *OE.*, assurance; security; assistance; warrant.

SURAT, *sô-rât'* [Skr. *Saurashtra*, good country]: large city of Brit. India, cap. of the dist. of S., in the Guzerat division of the Bombay presidency; 150 m. n. of Bombay, 14 m. by river (10 m. by land) from the mouth of the Taptí in the Gulf of Cambay. It is 6 m. in circumference, surrounded landward by a brick wall. The river at S. is said to be fordable, though at high tide it floats vessels of 50 tons. The English and Portuguese factories, the former now used partly as a lunatic asylum and partly as hospital, are imposing edifices of great solidity. S. is said (possibly with exaggeration) to have contained 800,000 inhabitants at the close of the 18th c., about which time it was doubtless the most populous city in India, and its markets were crowded with the costliest wares brought by merchants from remote countries. When its trade was transferred to Bombay, its pop. declined. Its trade and manufactures, almost extinct, revived during the civil war in the United States; and it now exports cotton and grain to Bombay, and is again increasing in inhabitants. S. is a place of considerable military strength, and the residence of a Brit. milit. com. and other dignitaries. Pop. (1871) 107,149; (1881) 113,417; (1891) 108,000; (1901) 119,306.

S., though long considered one of the most ancient cities of Hindustan, is now believed to have been a mere fishing-village as late as the 13th c. It rose into importance first as the spot whence the Mohammedans of Hindustan embarked on their religious voyage to Mecca. S. was sacked 1512 by the Portuguese soon after their arrival in India. In 1612 an Eng. force in two vessels, under Capt. Best, defeated the Portuguese, and obtained a *firman* from the Mogul emperor, authorizing the residence of a Brit. minister. The Dutch trade with S. began 1616. A French factory was founded 1668. In course of time the Eng. influence began to predominate; 1759 the castle and fleet were transferred to them; and from 1800 the govt. has been in their hands.

SURBASE, n. *sėr'bās* [F. *sur*, upon, and Eng. *base*]: in *arch.*, a cornice or series of moldings on the top of the base of a pedestal, etc. (see PEDESTAL). SURBASED, a. *sėr'bāst*, having a series of moldings on the top of the base. SURBASE'MENT, n. *-bās'mĕnt* [F. *surbaissement*]: the depression of any arch or vault which describes a portion of an ellipse.

Surbased Arch.

SURBATE, v. *sėr-bāt'*, or SURBEAT', v. *-bēt'* [F. *solbature*, foundering as of a horse—from *sole*, the sole of the foot; *battre*, to beat: L. *solĕa*, the sole]: in *OE.*, to bruise and batter the feet with much travelling; to harass; to fatigue. SURBA'TING, imp. SURBA'TED, pp.

SURBED, v. *sėr-bėd'* [F. *sur*, on or upon, and *bed*]: in *arch.*, to set stones on edge, or contrary to their natural bedding in the quarry. SURBED'DING, imp. SURBED'DED, pp.

SURBITON, *sėr'bĭ-ton:* suburb of Kingston, Surrey, Eng.; on the Thames river, and on the London and South-western railway; 12 m. s.w. of London. It is chiefly a residence-place, but contains the headquarters and recreation grounds of the Kingston Rowing and the Thames Sailing Clubs, and a cottage hospital.—Pop. (1891) 10,052.

SURCEASE, v. *sėr-sēs'* [F. *sursis*, delay—from *surseoir*, to delay, to suspend—from L. *supersĕdērĕ*, to refrain or desist from (see SUPERSEDE)]: in *OE.*, to be at an end; to stop; to leave off; to refrain finally: N. cessation; stop or stoppage. SURCEAS'ING, imp. SURCEASED, pp. *sėr-sēst'*.

SURCHARGE, v. *sėr-chârj'* [F. *surcharger*, to overload —from *sur*, upon, above; *charger*, to load (see CHARGE)]: to overload; to overcharge; to overstock: N. a load greater than can be well borne; an extra charge; a disallowed item in an account which those who present it have personally to pay. SURCHARG'ING, imp. SURCHARGED', pp. *-chârjd'*.

SURCINGLE, n. *sėr-sĭng'gl* [F. *sur*, over; L. *cingŭlum*, a girdle, a sword-belt—from *cingo*, I bind round]: a belt or band which passes over a saddle, or anything laid on a horse's back, in order to bind it fast; the girdle of a cassock. SURCIN'GLED, a. *-sĭng'gld*, girt or secured with a surcingle.

SURCOAT, n. *sėr'kōt* [F. *sur*, over, and Eng. *coat*]: a short overcoat; the long and flowing drapery of a knight.

Surcoat.—Monument of William Longespée, Salisbury Cathedral.

SURCULUS, n. *sėr'kū-lŭs*, SUR'CULI, n. plu. *-lī* [L. *surcŭlus*, a small twig]: in *bot.*, a sucker; a shoot thrown off under ground, and only rooting at its base; used also in Eng. form, SURCLE, n. *sėr'kl*.

SURD, n. *sėrd* [L. *surdus*, deaf, dull, indistinct]: in *alg.*, a quantity which cannot be expressed by rational numbers or exactly determined, as the square root of 2, or the cube root of 3 (see IRRATIONAL NUMBERS): ADJ. that cannot be expressed by rational numbers; in *OE.*, deaf.

SURE, a. *shôr* [F. *sûr;* OF. *seür* and *segur*, sure, safe—from L. *secūrus*, free from care, safe (see SECURE)]: certain; not liable to failure, loss, or change; firm; stable; free from doubt or danger; in *OE.*, betrothed: AD. certainly; without doubt. SURE'LY, ad. *-lĭ*, certainly; undoubtedly; without hazard. SURE'TY, n. *-tĭ*, security against loss or damage; hostage; foundation of stability; certainty; in

law, one bound with and for another; a bail; evidence (see GUARANTY, in Law): in *OE.,* ratification: V. to be security for; to guarantee. SURE'TISHIP, or SURE'TYSHIP, n. state of being surety; obligation of being bound to answer for another (see GUARANTEE). SURE'FOOTED, a. treading firmly; not liable to stumble or fall. TO BE SURE, to know certainly; to be without doubt: also used as an adv. expression; certainly; surely. TO MAKE SURE, to secure so that no failure may take place.—SYN. of 'sure, a.'; unfailing; infallible; unquestioning; safe, permanent; steady; strong; secure; indisputable; confident; positive; undoubting; indubitable;—of 'surety, n.': support; hostage; bondsman; security.

SURETYSHIP: a word derived from the French *sûreté;* and the Latin *securitas,* which means freedom from care. It signifies the obligation of a person to another for the debt, fault or non-performance of another, and to make good any loss occasioned thereby to the extent provided in the contract. The difference between suretyship, and guarantee is an essential one, a contract of suretyship being a direct liability to the creditor for the act to be performed by the debtor, whereas a guarantee is liability only for the debtor's ability to perform this act. A contract of suretyship is an immediate and direct undertaking that the act shall be done, and if the act is not done, the surety becomes responsible at once.

The constitution of the U. S. makes it impossible for any state to enforce a law which might be construed as impairing the rights of a creditor under a contract of suretyship, but like other contracts it may be vitiated and annulled through fraud or duress in the execution.

The surety's responsibility cannot be changed, or the contract modified in any manner without his consent, and should any change be made in the contract without such consent, the surety is discharged from his obligation. It does not matter whether the change would be advantageous to the surety or otherwise, he has a right to stand upon the original terms, and cannot be held responsible for any different terms. This applies also to any extension of the term of credit specified in the contract without the surety's approval in legal form.

Upon discharge of his obligation by the debtor, the surety is of course released. Should the debtor default, and the surety have to pay, the surety becomes entitled to all the rights and securities previously held by the creditor. If there are several sureties, and the creditor's claim is enforced against one only, the latter can compel his cosureties to pay their several shares, and he also has a claim against the principal for the amount which he has expended in meeting the obligation. See GUARANTEE.

SURF, n. *sérf* [according to Skeat, the same word as *sough,* a rushing noise (see SOUGH 1: comp. Norm. *etchurfer,* to foam)]: the foaming or broken water made by

the waves beating on the shore. SURF'Y, a. *-ĭ*, abounding with surf. SURF-BOAT, a light strong boat capable of passing easily and safely through heavy surf.

SURFACE, n. *sėr'fās* [F. *surface*, outside—from L. *superficiēs*, the upper side of a thing—from *super*, above; *faciēs*, the face]: the upper face or side of a thing; the outside; the upper stratum of the soil; in *geom.*, that which has length and breadth only: ADJ. on the outside; external; hollow; insincere. SUR'FACEMAN, n. in *rail.*, one who keeps the railroad track in order.

SURFACE GRUB: caterpillar of any of the common moths of the family *Noctuidæ*, of which there are more than 1,500 species in the United States, the most of them with dingy clouded fore-wings, with a 'stigma,' sometimes silvery, in the center. The larvæ are mostly hairless. An example is the *Great Yellow Underwing Moth* (*Triphœna pronuba*), large moth with upper wings deep brown or pale tawny, under wings bright orange with a black border. This moth abounds in hay-fields in Britain at the season of haymaking. The caterpillar, full-grown, is nearly an inch and a half long, pale green with tinge of brown, dotted with black, three pale lines down the back, and seven black spots on the inside of each of the two outer ones. It often does great mischief to roots of cabbage and turnips, and devours the roots of grass.

SURF-FISH: one of the many small ovoid fishes of the family *Embiotocidæ*, related to the percoids, which abound upon the Pacific coast of North America, where they are found numerously in the surf on sandy beaches, and in the mouths of rivers. They are often gayly colored, sometimes in extraordinary patterns of spots or bars; and are easily caught but not valued much as food. The most familiar one is *Amphisticus argenteus;* several others are locally known as the blue, black, red and white perches, the alfione, etc. All are viviparous.

SURF-SMELT: a small, toothsome smelt (*Hypomesus pretiosus*), numerous along the coast of California and northward, where it spawns in the surf, and is caught in great quantities in nets.

SURF DUCK, or SURF SCOTER, *skō'tėr* (*Œdemia perspicillata*): species of Scoter (q.v.), extremely plentiful on the coasts of Labrador, Hudson's Bay, and other very northern parts of America, whence great numbers migrate s. in winter. It is a rare visitant of European coasts. In size it is about equal to the Mallard. The plumage is black, except two patches of white on the head and back of the neck. The bill is variegated with white, pink, and orange. It is never seen on lakes or rivers, but only on the seacoast. It dives so quickly that it is very difficult to shoot except on the wing. Its flesh is rank, with fishy taste.

SURFEIT, n. *sĕr'fĭt* [OF. *surfait*, excess—from F. *sur*, over, and *faire*, L. *facĕrĕ*, to do]: excess in eating and drinking; sickness or satiety caused by overfulness; nausea: V. to supply with food or drink to satiety or sickness; to cloy; to be fed to overfulness or to satiety. SUR'FEITING, imp.: N. act of feeding to excess; gluttony. SUR'FEITED, pp.: ADJ. fed to a surfeit or satiety. SUR'FEITER, n. *-ĕr*, one who surfeits.

SURGE, n. *sĕrj* [OF. *sourgeon*, the spouting up of water in a fountain—from L. *surgĕrĕ*, to rise, to boil or bubble up: F. *sourdre*, to rise, to spring]: the large waves or billows; a great rolling swell of water; in *ship-building*, a certain tapered part of a capstan: V. to swell; to rise high and roll, as waves; to slip back, as a cable; to let go suddenly, as a rope. SUR'GING, imp.: ADJ. swelling and rolling, as great waves. SURGED, pp. *serjd*. SURGY, a. *ser'jĭ*, rising in high waves or surges; full of great waves. SURGE'LESS, a. *-lĕs*, free from waves; smooth. SURGE-BEATEN, a. beaten by high rolling waves.

SURGEON, n. *ser'jŭn* [OF. *cirurgien;* F. *chirurgien*, a surgeon—from mid. L. *chirur'gus;* Gr. *cheirour'gos*, one who works with the hand, an operating medical man—from Gr. *cheir*, the hand, and *ergon*, work]: one whose occupation is to cure or alleviate injuries and diseases of the body by manual operations; also, a general medical practitioner. SUR'GEONCY, n. *-sĭ*, office or employment of a surgeon. SUR'GERY, n. *-jĕr-ĭ* [OF. *sirurgie*]: act or art of curing or alleviating injuries or diseases of the body by manual operations (see below): place or room in which a surgeon operates; private shop for dispensing, attached to the house of a practitioner. SUR'GICAL, a. *-jĭ-kăl*, pertaining to surgeons; done by an operation with the hand, as cutting out a tumor. SUR'GICALLY, ad. *-lĭ*.

SUR'GEON, IN UNITED STATES ARMY AND NAVY: medical officer appointed from civil life.—Surgeons in the army and navy of U. S. are appointed by the President on the recommendation of the surgeon-general of the army and the officer commanding the bureau of medicine and surgery in the navy. Candidates for the army must be between 22 and 29 years of age; navy, between 21 and 30. They must be graduates of a medical school in good standing, and must satisfactorily pass an examining board.

When admitted to the service they are made assistant surgeons in the army with the rank, pay, and emoluments of first lieutenant of cavalry for the first five years of service, and the rank, pay, and emoluments of the grade of captain after five years service. In the navy they start with the rank of lieutenant, junior grade.

In the army, a course of study for five months in the Army Medical Museum at Washington is required before assignment to regular duty, and before being appointed as full surgeon a candidate must have been assistant surgeon for at least five years. In the army the medical corps consists of a surgeon-general, with the rank of brigadier-

general: one assistant surgeon-general, ranking with a colonel of cavalry; 1 chief purveyor and 4 assistants with the rank of lieutenant-colonel; 60 surgeons with the rank of major: 150 assistant surgeons with the rank of first lieutenant, and 5 medical storekeepers with the rank of captain of cavalry.

In the navy, the medical corps consists of 15 medical directors, 15 inspectors, 56 surgeons, 55 passed assistant surgeons, and 55 assistant surgeons.

The surgeon-general of the army supervises all military hospitals, all medical and chirurgical practice which concerns the army, provides proper food for the sick in hospital, and has charge of the Army Medical Museum and the surgeon-general's office.

SUR'GEONS, COLLEGE OF: association (Royal College of Surgeons of England) dating its origin from 1460–1, when Edward IV. 'did, at the supplication of the freemen of the mystery of barbers of the city of London using the mystery or faculty of Surgery, grant to them that the said mystery, and all the men of the same mystery of the said city, should be one body and perpetual community.' (See BARBER: BARBER-SURGEON.) In 1500 four masters in surgery were appointed. To check unqualified persons from practicing surgery, it was enacted (1511) 'that no person within the city of London, or within seven miles of the same, shall take upon him to exercise or occupy as a physician or surgeon except he be first examined, approved, and admitted by the bishop of London, or by the dean of St. Paul's, calling to him four doctors of physic, and for surgery other expert persons in that faculty.' Hence arose a company, the Surgeons of London. In 1540 the Company of Barbers of London and the Company of Surgeons of London were united. In 1745 the surgeons of London were by act of parliament separated from the barbers, and made a distinct corporation. In 1800 this company was dissolved, and replaced with their former and additional privileges by 'The Royal College of Surgeons of London,' to which a new charter was granted 1843. The council has power to admit members, and from these, on examination, fellows: it may admit also certain classes of persons as fellows, without examination. The college is likewise empowered to test the fitness of persons to practice midwifery, and to grant certificates of such fitness; and to test the fitness of persons to practice as dentists, and to grant certificates of such fitness. A candidate for membership in the college is required to pass examination in the usual branches of a liberal education. For details, see *Calendar of the Royal College of Surgeons of England.*

The museum is admirably complete: its basis was the Hunterian Collection (see HUNTER, JOHN), which was estimated to consist of 13,682 specimens: the total number of specimens exceeds 40,000. The library contains 36,000 vols. The museum and library are readily accessible to visitors. The buildings are in Lincoln's Inn Fields, London.

SURGEONS OF EDINBURGH, ROYAL COLLEGE OF: originally an assoc. of those professing 'surregerie and barbour-craft,' who obtained their first civic charter 1504, and had it confirmed by James IV. 1505. The nominal connection with the barbers was dissolved 1732. A patent of 1694 settled the relations between the surgeons and the physicians, making amicable terms possible. In 1851 the college was freed from the galling control of the town council. It sanctions the lectures of a staff of its own members as qualifying for examination candidates for its diploma of licentiate, and appoints a board of examiners.

SUR'GERY: act or art of remedial treatment of bodily injuries or diseases by manual operation. S., as distinguished from the practice of medicine, which denotes treatment of internal diseases by means of drugs, etc., is doubtless nearly as old as man himself; but its true history begins with Hippocrates, B.C. 5th c. He was acquainted with the ordinary means of counter-irritation, e.g., issues, a kind of moxa, and the actual cautery. He seems to have performed capital operations with boldness and success; he reduced dislocations and set fractures, but clumsily and cruelly; extracted the fetus with forceps when necessary; and both used and abused the trepan. He did not perform lithotomy, whose practice seems to have been then confined to a few. Two centuries after his time, at the death of Alexander the Great, Alexandria became the great school of anatomy, surgery, and medicine. Herophilus and Erasistratus, B.C. 300, were distinguished for surgical skill and anatomical knowledge. Ammianus, of this school, invented an instrument by which he broke down stones in the bladder; anticipating by about 2,000 years Civiale's discovery of lithotrity. When the great Alexandrian Library was destroyed by fire, Rome became the headquarters of all the sciences. The early Romans held surgeons and physicians in abhorrence; and trusted for cures, even in cases of dislocation and fracture, to spells and incantations. The first regular surgeon in Rome was Archagathus, B.C. 220, student of the Alexandrian school. The old prejudices soon occasioned his banishment. The first Roman surgeon of real merit was Celsus, at the beginning of the Christian era, who improved the mode of lithotomy and amputation, described the operation for cataract, and first recommended ligatures for arresting hemorrhage from wounded arteries. His works present surgical knowledge at his time. Aretæus of Cappadocia, in Rome, latter half of the 1st c., was the first to employ blisters, using cantharides (still used) for that purpose Rufus of Ephesus, half a century later, first tied an artery which had become aneurismal from a wound in venesection. Galen, Rome, last part of the 2d c., obtained his great reputation mainly by medical practice. His S. was confined mostly to fomentations, ointments, and plasters; to bandaging; and to use of complicated machinery in fractures and dislocations. Aëtius, 6th c., recommended scarification of the legs in dropsy, tried to dissolve urinary calculi by internal remedies, studied diseases of the eye,

and is the first writer who notices the guinea-worm. Paulus Ægineta, 7th c., opened internal abscesses by caustics, improved lithotomy, described several varieties of aneurism, extirpated the breast, performed laryngotomy and tracheotomy, and originated embryotomy: his sixth book is deemed the best body of surgical knowledge previous to the revival of letters. Rhazes, Arabian in charge of a hospital at Bagdad, at the end of the 9th c., was the first to describe (but not correctly) spina bifida; he cauterized the bites of rabid animals, and gave better account of hernia than any predecessor. To Avicenna, a century later, probably is due the first use of the flexible catheter. Albucasis (d. 1122) describes an instrument for cure of fistula lachrymalis, the removal of tumors by ligatures, the suture of wounded intestines, the use of the probang in obstruction of the gullet, etc.; and is the only ancient writer who describes the instruments used in each surgical operation. In 1271 Pitard laid the foundation of the College of Surgeons of Paris. In Britain, Gilbertus Anglicanus, about the beginning of the 14th c., is the first known surgical writer. In the middle of that century, Guy de Chauliac, the first to describe the Cesarean operation, practiced at Avignon; and a contemporary was John of Ardern. During the 15th c., lithotomy was removed from the hands of itinerant quacks into the department of S., by Colot, surgeon to the French court. The College of Surgeons in England dates from this century (see SURGEONS, COLLEGE OF). In the 16th c., Ambrose Paré (q.v.) greatly advanced the profession: his works were pub. 1535. Toward the close of this century, Fabricius ab Acquapendente (q.v.), to whom is due the modern trephine, and the use of the tube in tracheotomy, published *Opera Chirurgica*, which passed through 17 editions. Wiseman (about 1660) has been termed 'the Paré of England,' and 'the true father of British surgery;' he was sergeant-surgeon to Charles II.: his works were pub. 1676. He was the first to dispel the dangerous belief that gunshot wounds were of a poisoned nature, requiring the most painful kinds of dressing. Contemporary with him were James Young of Plymouth, who first performed the flap-operation in amputation; Scultetus (a German), author of *Armamentarium Chirurgicum;* Frère St. Cosme, commonly known as Frère Jacques, French monk, who considered himself commissioned by heaven to cut for stone, and who has the merit of converting the tearing into a cutting operation; Rau of Leyden, one of the most successful lithotomists of any age, pupil of Frère Jacques; and Roonhuysen, who may be regarded as the inventor of tenotomy. The 18th c. produced, in England, White, originator of excision of joints; Cheselden and Douglas, famous lithotomists; Percival Pott, John Hunter, and Hey of Leeds; in Scotland, Monro and John Bell; in France, Petit and Desault—the former renowned for his work on Diseases of the Bones, the latter distinguished for improvements in surgical in-

struments; in Germany, Richter and the illustrious Haller; in Italy, Lancisi, Morgagni, and Scarpa.

The advance of surgery in the 19th c. has been brilliant: the list of distinguished names, in various countries, is so long that only a portion can here be adduced as representative of the rest. The London medical schools show the names of Abernethy, Brodie, Astley Cooper, Aston Key, Liston, and many others nearly equally renowned of the earlier date; and the later names of Bowman, Erichsen, Prescott, Hewett, Hilton, Paget, Spencer Wells, and a host of others. In Edinburgh were Sir Charles Bell, Lizars, Miller, Syme, and Simpson, discoverer of the application of chloroform. A revolution in surgical practice and technique has been brought about by the introduction of aseptic and antiseptic methods, with which the name of Joseph Lister is associated. Among the many American names eminent in surgery are Philip Syng Physick, John Rhea Barton, Valentine Mott, Ephraim McDowell, first to practice ovariotomy; Henry J. Bigelow, who showed the way to crush and remove a vesical calculus at one operation; J. Marion Sims, Cornelius R. Agnew, Samuel D. Gross, D. Hayes Agnew, Frank H. Hamilton, and others still living.

Surgery is enlarging and advancing in such degree that even comparatively recent standard treatises can scarcely show its state of to-day in all its special departments.

With the increase of knowledge in surgery, as in other sciences, specialties naturally develop themselves. Diseases of the eye and of the ear, those peculiar to women and to children, and deformities (department of Orthopædic Surgery), more or less separate themselves, at least in large towns, from general surgery, and form special departments.

SURGICAL ASSOCIATION, AMERICAN: a society organized in 1880, the objects of which are to promote the improvement of the science and art of surgery. The active membership is limited to 125 fellows, and the honorary membership to 25 fellows. An applicant for fellowship must be 30 years of age, a graduate of five years standing from a recognized medical college, and have an established reputation as practitioner, author or investigator. Meetings are held annually, and an annual volume of 'Transactions' is published. Every third year the association joins with other associations constituting the Congress of American Physicians and Surgeons in a meeting held in Washington, D. C.

SU'RICATE, or MEERKAT: a South African civet (*Suricata tridactyla*), which differs from typical viverrines in several points, notably in having only four toes on each foot. The body and head reach a length of 12 or 13 inches, the tail 6 inches, and the animal has a general resemblance to a small raccoon, but the tail is more cat-

like. It lives in caves and rock-caverns, or sometimes digs burrows. It is diurnal, lives mainly on roots, and barks like a dog.

SURIGAO, Philippines: (1) Town, capital of the province of Surigao, Mindanao; on the extreme n. coast of the island of Mindanao. This district was the site of the first Spanish mission in the Philippines; in 1879 a series of earthquakes caused the ground in the neighborhood of the town to sink two feet, and many of the government buildings were rendered uninhabitable for a time. The chief industries are the gathering and export of pearl shells and trepang, and the placer mining of gold. Pop. 6,285.

(2) Province, island of Mindanao, occupying the n.e. part of the island, bounded on the s. by Dávao and on the w. by Misamis; length from n. to s., 217 m.; width, 83 m.; area 12,539 sq.m., with dependent islands 13,201 sq.m. The principal dependent island is Dinagat, lying off the n. coast; it is mountainous, heavily wooded, and has deposits of gold; area 387 sq.m.; the second island in importance is Siargao (q.v.), 190 sq.m. The mainland of the province is traversel by two mountain ranges, extending from n. to s., one near the e. coast, the other forming the w. boundary; spurs of these ranges extend in both directions. The central valley is drained by the Agusan river, one of the finest in the Philippines. Cotton, hemp, rice, sugar, tobacco, indigo, etc., are cultivated; the cocoanut, betel nut, and betel pepper are grown for export. Gold is found in the mountains and in the sands of the mountain streams, and is mined; the forests are valuable, and gums and resins are obtained in large quantities; fishing is an important industry; and there is some weaving of native fabrics for home use. There are few roads, the communication is by sea or by the rivers and lakes of the central valley. Civil government was established in the province in 1901, May, but the jurisdiction of the provincial government does not extend to the non-Christian tribes. Pop. 85,125.

SURIGAO, Strait of: connecting the Sulu sea with the Pacific, having Mindanao on the s., and the islands of Leyte, Panaón Bohol, Cebu, Negros, and Samar on the n. It was the route taken by Magellan after crossing the Pacific. The San Bernardino strait is now used more than Surigao during certain seasons, but Surigao is the more direct, and deeper throughout, and the more advantageous route for vessels bound for the Southern Philippines.

SURIMAM. See Guiana—*Dutch Guiana.*

SURINAM' BARK. See Andira.

SURINAM TOAD, or Pipa Toad: a toad of the South American family *Pipidæ;* specifically *Pipa americana.* It is one of the largest and the most repulsive-looking of

the toads, and is noted for its extraordinary mode of developing the eggs and young. When the female is about to expel her eggs the male mounts upon her back, and the eggs as they are extruded are squeezed upward between the back of the female and the belly of the male, where they stick to her skin, and gradually sink into the spongy skin, each occupying a pit with a lid. Fertilization takes place by some process not well understood just before the extrusion of the ova. The eggs remain in the pits until they have reached a mature condition (although yet very small) and then escape into the water.

SURLOIN, n. *sėr'loyn:* a spelling of SIRLOIN, which see.

SURLY, a. *sėr'lĭ* [OE. *sirly* or *sir-like,* magisterial, arrogant, compounded of *sir* and *like*]: cross; rude; uncivil; gloomily morose; snarling. SUR'LILY, ad. *-lĭ.* SUR'LINESS, n. *-nĕs,* crabbed ill-nature; moroseness.

SURMISE, v. *sėr-mīz'* [OF. *surmise,* accusation—from *surmettre,* to lay upon, to accuse—from L. *super,* upon; *mittĕrĕ,* to send]: to imagine without certain knowledge; to suspect; to form a notion or opinion on slight evidence, or from some trivial circumstance; to conjecture: N. the notion or opinion that something exists of which we have no certain evidence; a conjecture; a supposition. SURMI'SING, imp.: N. the act of suspecting. SURMISED, pp. *-mīzd'.* SURMI'SER, n. *-mī'zėr,* one who surmises.—SYN. of 'surmise, n.': suspicion; doubt; guess; speculation; divination; hypothesis.

SURMOUNT, v. *sėr-mownt'* [F. *surmonter,* to excel—from *sur,* upon; *monter,* to mount—from F. *mont;* L. *mons* or *montem,* a hill]: to rise above; to overcome, as difficulties; to surpass. SURMOUNT'ING, imp. SURMOUNT'ED, pp.: ADJ. in *arch.,* applied to an arch or dome rising higher than a semicircle; in *her.,* applied to a charge over which is another charge of different color or metal. SURMOUNT'ABLE, a. *-ă-bl,* that may be overcome; superable. SURMOUNT'ABLY, ad. *-blĭ.* SURMOUNT'ABLENESS, n. *-bl-nĕs,* the state of being surmountable.—SYN. of 'surmount': to conquer; exceed; vanquish; subdue.

SURMULLET, n. *sėr-mŭl'lĕt* [F. *surmullet*—from *saur,* yellowish-brown, and *mulet,* a mullet], (*Mullus*): genus of acanthopterous fishes of family *Mullidæ,* a small family formerly included in *Percidæ,* distinguished by having two dorsal fins widely separated from one another, the first spinous; and large, easily detached, strongly ciliated scales on head and body. The genus *Mullus* has no teeth on the upper jaw, but a disk of pavement-like teeth on the front of the vomer. Two long barbels hang from the under jaw, or, when not in use, are folded up against it. Only two species are known, both abundant in the Mediterranean. They are called MULLET, by

which they are confounded with a very different genus. The STRIPED S., or STRIPED RED MULLET (*M. surmuletus*), sometimes approaches the s. coasts of England in summer, and many are then taken in mackerel nets. It sometimes attains, in the Mediterranean, a weight of six or seven lbs.; but in Brit. seas seldom more than two lbs. The ancient Romans held it in highest esteem, and gave prodigious prices for fish unusually large. They kept surmullets in their *vivaria*. The color is pale pink, with three or four yellow longitudinal stripes; but where any of the scales have been rubbed off, beautiful tints of purple and bright red appear, as also during the struggles of the fish when dying: therefore the Romans were accustomed to bring surmullets alive into their banqueting-rooms, that the guests might see them die, and enjoy the brilliant display of color befor eating the fish. The liver was regarded as peculiarly delicious, and was bruised in wine to make a *garum* for the flesh. The S. is still regarded as one of the best of fishes.—The RED S., or PLAIN RED MULLET (*M. barbatus*), is a much smaller fish. Other species of *Mullidæ* are found in tropical seas.

SURMULOT, n. *sėr'mū-lŏt* [F. *surmulot*—from *saur*, yellowish brown, and *mulot*, a field-mouse]: the common brown or Norway rat.

SURNAME, n. *sėr'nām* [F. *surnom*, a surname—from *sur*, upon; *nom*, a name—from L. *nomen*, a name: It. *soprannome*]: the family name added to the baptismal or Christian name—e.g., John Smith, *Smith* being the surname, *John* the baptismal or Christian or 'given' name. The surname may have been so called from the practice of writing it *over* the Christian name, seen in the court rolls and other ancient muniments. The Roman *cognomen* partook of the same character; but the introduction of the surnames of modern time cannot be traced further back than the latter part of the 10th c.: see NAME: V. to give a surname to, or to call by one. SUR'NAMING, imp. SUR'NAMED, pp. *-nāmd*. SURNOM'INAL, a. *-nŏm'ĭ-năl*, relating to surnames.

SURPASS, v. *ser-pâs'* [F. *surpasser*, to overtop—from *sur*, beyond; *passer*, to pass (see PASS)]: to go beyond in anything; to excel; to exceed. SURPASS'ING, imp.: ADJ. excellent in an eminent degree; exceeding others. SURPASSED', pp. *-pâst'*. SURPASS'ABLE, a. *-pâs'să-bl*, that may be exceeded. SURPASS'ABLY, ad. *-blĭ*. SURPASS'INGLY ad. *-sĭng-lĭ*. SURPASS'INGNESS, n. *-nĕs*, the state of being surpassing.—SYN. of 'surpass': to excel; outdo; outstrip transcend.

SURPLICE, n. *sėr'plĭs* [OF. *surpeliz*; F. *surplis*, a surplice—from mid. L. *superpellic'eum*, a surplice—from L. *super*, over; *pellicĭus*, made of skins—from *pellis*, a skin] outer, long, white linen or muslin robe, with wide sleeves, worn by officiating clergymen and choristers in the Roman and Anglican churches; also, on certain days, by students in the Eng. universities: the short S. worn by choristers is called a *cotta*. In early ages, the priests during their long services in winter wore dressed sheep-skins or furs (*pelliceæ*).

which they usually concealed by a long and full white linen robe (*super-pelliceæ*), whence the term *surplice.*—The S. in its present lengthened form (in strictness it extended only to the waist) is usually supposed to be derived from the longer and more flowing vestment, which in the Rom. Cath. Church is still used in the mass, and is called the Alb (q.v.), though in that church the S. is now worn not only by priests, but by all admitted even to the church tonsure. The S. is worn also, with the stole, by priests in administration of the sacraments; and it is worn in preaching.—The use of the S. was strongly objected to by the Calvinistic and Zwinglian Reformers on the continent, and by the Puritans in England, who regarded this vestment as a relic of popery, and made it the subject of vehement denunciations. The argument against it is in Beza, *Tractat. Theolog.*, III., 29, and its defense in Hooker's *Ecclesiastical Polity*, book V., ch. 29. Till attention to ritual became common in the Church of England and in the Prot. Episc. Church, no little stir arose from time to time from the use of the S. by the preacher in the pulpit, contrary to the then more usual practice. Preaching in the S. seems from some cause to be associated in the popular mind with a Romanizing tendency. SURPLICE, v. to robe in a surplice. SUR'PLICING, imp. SUR'PLICED, pp. *-plĭst:* ADJ. wearing a surplice.

Surplice, Brass of Prior Nelond, Cowfold, Sussex

SURPLUS, n. *sėr'plŭs* [F. *surplus*, surplus—from F. *sur*, over, and F. and L. *plus*, more]: that which remains over beyond what is wanted; excess; what remains of an estate after debts, etc., have been paid: ADJ. exceeding what is wanted or necessary. SUR'PLUSAGE, n. *-āj*, that which remains over; in *law*, something in the pleadings or proceedings not necessary to the case.

SURPRISE, v. *sėr-prīz'* [F. *surprise*, surprise, astonishment—from F. *surprendre*, to take unawares—from L. *super*, above; *prehendĕrĕ*, to take]: to take unawares; to assail unexpectedly; to come upon one suddenly; to strike with wonder; to throw the mind into confusion by presenting something suddenly to the view or the mind: N. the act of coming upon unawares; the state of being taken unawares; an emotion of the mind excited by something happening suddenly and unexpectedly; astonishment; wonder; amazement. SURPRI'SING, imp.: ADJ. of a nature to excite wonder and astonishment; astonishing. SURPRISED', pp. *-prīzd'*. SURPRI'SINGLY, ad. *-zĭng-lĭ*. SURPRI'SAL, n. *sėr-prī'zăl*, the act of taking unawares; sudden perplexity or confusion.—SYN. of 'surprising, a.': extraordinary; strange; curious; wonderful; astonishing; unexpected.

SURQUEDRY, n. *sĕr'kwē-drĭ*, or SUR'QUIDRY [OF. *surcuidance*, presumption; *surcuider*, to presume]: in *OE.*, overweening pride; insolence; presumption.

SURREBUTTER, n. *sĕr'rĕ-bŭt'tĕr* [F. *sur*, upon, and Eng. *rebutter*]: in *law*, the reply of a plaintiff in matters of fact to the defendant's *rebutter*. SURREJOINDER, n. *sĕr'rĕ-joyn'dĕr* [F. *sur*, upon, and Eng. *rejoinder*]: the reply of the plaintiff in matters of fact to the defendant's *rejoinder*.

SURRENDER, v. *sŭr-rĕn'dĕr* [OF. *surrendre*, to deliver up—from F. *sur*, over; *rendre*, to render (see RENDER)]: to deliver up, as one's self; to yield to the power of another; to give or deliver up; to resign; to yield to any influence; to relinquish; in *mil.*, to lay down arms and yield, as a prisoner of war: N. the act of resigning one's person, or the possession of something, into the hands of another; a yielding or giving up; in *Eng. law*, a mode of alienation of real estate, the converse of release. SURREN'DERING, imp. SURREN'DERED, pp. *-dĕrd*. SURREN'DERER, n. *-ĕr*, one who surrenders. SURREN'DEROR', n. *-dĕr-ŏr'*, in *Eng. law*, tenant who surrenders an estate into the hands of his lord. SURREN'DEREE', n. *-dĕr-ē'*, in *law*, the person to whom the lord grants surrendered land.

SURREPTITIOUS, a. *sŭr'rĕp-tĭsh'ŭs* [L. *surreptitĭus*, stolen, surreptitious—from *surrep'tus*, snatched away secretly—from *sub*, under; *raptus*, seized; *rapĕrĕ*, to seize]: done by stealth or without authority; underhand; made or introduced fraudulently. SUR'REPTI'TIOUSLY, ad. *-lĭ*, fraudulently; by stealth.

SURREY, *sŭr'ĭ* [Sax. *Suth-rice*, the south kingdom]: inland and metropolitan county in s. England; bounded n. by Middlesex, e. by Kent; 485,129 acres, or 758 sq. m. S. is traversed from w. to e. by a well-marked ridge of the North Downs, which rises in Botley Hill, above Titsey, 880 ft. On the n. side of this range, the land slopes gradually to the banks of the Thames, which skirts the n. border; but on the s. side, the descent is rugged and broken, affording pleasing and sometimes romantic scenery. South of the main range, and about four m. s. of Dorking, is Leith Hill, 993 ft. high, the most important elevation in this region. Along the s. bank of the Thames, over a space about six m. wide, is a tract which belongs to the London clay formation; further s., likewise extending from w. to e., is a tract of plastic clay, one to five m. wide. Chalk, weald clay, and iron-sand formations occupy the south. The principal streams are the Mole and Wey, tributaries of the Thames. The soil of the n. half of the county is fertile; in the w. and s w., the land is largely covered with heath. The climate is soft and mild in low-lying districts, and is favorable to production of grain and grass. More than four-fifths of the entire area are under culture. In the n., in the vicinity of London, are numerous market-gardens, whose produce supplies the markets of the metropolis. Hops, wheat, and the ordinary crops are raised. The county contains much woodland; and the beauty of the scenery, and the facility of communication with Lon-

don, have attracted many residents to S., which is consequently studded with mansions and villas. Manufactures are carried on in Southwark and other s. suburbs of London; as well as in Croydon, Guildford, Kingston, and Reigate, the principal towns of Surrey.

Nearly two-thirds of the pop. belong to the metropolitan dist. of London (q.v.); but practically the suburbs of London occupy the greater part of the county; and the great increase in the pop. of S. (600 per cent. since the beginning of the 19th c.) is due to the establishment here of the residences of professional and business men of London.—Pop. of S. (1801) 268,233; (1871) 1,091,635; (1881) 1,436,899; (1891) 1,730,871; (1901) 2,000,000.

SUR'REY, HENRY HOWARD, Earl of: soldier and poet: 1516(?)–1547, Jan. 19; b. England; son of the third Duke of Norfolk. He was brought up at the court of Henry VIII.; accompanied the Duke of Richmond to France; took part in the trial of Anne Boleyn 1536; and served again in France 1540. In 1544 he commanded the army in France, was promoted to field-marshal, and appointed gov. of Boulogne after its occupation. Meeting with milit. reverses 1546, Jan., he was recalled. His father, the Duke of Norfolk, was suspected of aiming at the throne; and S., being suspected of conspiracy with him, was imprisoned in the Tower; and, for quartering the royal arms with his own, was charged with treason and beheaded—the last of Henry VIII.'s many acts of tyranny. S. was a man of generous and heroic spirit, of refined and elegant manner, and of a highly cultivated mind. He translated the second and fourth books of the *Æneid*, and composed numerous sonnets, amatory poems, and paraphrases of the Bible. He was one of the heralds of the great Elizabethan movement in poetic composition.

SURROGATE, n. *sŭr'rō-gāt* [L. *surrogātus*, elected in the place of another, pp. of *surrogo*—from *sub*, under; *rogo*, I ask]: in England, deputy of an ecclesiastical judge, usually of a bishop or his chancellor; officer authorized to issue marriage licenses.—In the United States, the S. is a judge having jurisdiction in regard to the probate of wills and the appointing or confirming of administrators and guardians. But the judge holding this jurisdiction is not called S. in all the states: in some of the states he is known as probate judge, in others register, in others judge of the orphans' court, etc. The jurisdiction of the S. is ordinarily limited to his county.

SURROUND, v. *sŭr-rownd'* [F. *sur*, upon, and Eng. *round*]: to inclose on all sides; to encircle; to encompass; to fence about. SURROUND'ING, imp.: ADJ. being on all sides of; inclosing. SURROUND'ED, pp. SURROUND'INGS, n. plu. *-ĭngz*, external or attending circumstances; the environments of any place.—SYN. of 'surround': to environ; invest; hem in; circumscribe; inclose; limit; bound; include; confine.

SURSOLID, n. *sĕr-sŏl'ĭd* [F. *sur*, above, and Eng. *solid*]: in *arith.*, the fifth power of a number: ADJ. pertaining to or involving, the fifth power of a number.

SURTAX, n. *sĕr'tăks* [prefix *sur-*; Eng. *tax*]: additional or extra tax; a tax increased for a special purpose.

SURTOUT, n. *sĕr-tōt'* or *sĕr-tō'* [F. *surtout*—from F *sur*, over; *tout*, all: mid. L. *supertōtus*, a garment put over all others—from L. *super*, over; *tōtus*, all, the whole] *formerly*, an overcoat; *now*, a coat having a wide skirt reaching about the knees.

SURTURBRAND, n. *sĕr'tĕr-brănd* [Icel. *surtarbrandr*—from *svartr*, black, and *brandr*, a firebrand]: in *geol.*, peat-like variety of Brown Coal (q.v.) or Lignite (q.v.), occurring in the Pliocene deposits, and sometimes under the volcanic overflows in n. Iceland, and there used for fuel. It has great resemblance to the black oak found in bogs. It is capable of being made into tables and other articles of furniture, but is too brittle to be shaved by a plane

SURVEILLANCE, n. *sĕr-vāl'yăns* [F. *surveillance*, superintendence—from *surveiller*, to watch, to have an eye upon—from L. *super*, over; *vigilārĕ*, to watch]. oversight; watch; inspection.

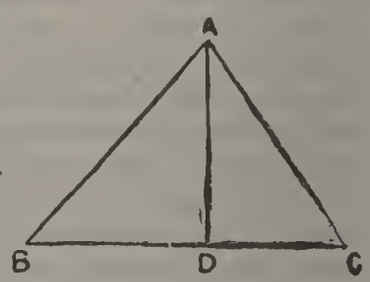
SURVEY, v. *sĕr-vā'* [OF. *surveoir*, to oversee—from L. *super*, over; *vidērĕ*, to see, to overlook]: to overlook; to inspect, to view with attention, as from a height; to oversee; to measure, as land; to examine attentively a district of country with the view of determining its area, the distances between the most prominent objects, the best possible track for a railway or canal, etc.; to examine a line of coast in *OE.*, to perceive. SURVEY, n. *sĕr'vā*, an attentive view; an examination of all the parts and particulars: the operation of examining attentively a district of country, a line of coast, a sea, etc., with the view of determining distances, the bearing of objects, etc. SURVEY'ING, imp.; N. act or art of measuring land, laying down tracks, taking the bearings of objects, etc., in any district of country (see below). SURVEYED', pp. *-vād'*. SURVEY'OR, n. *-ĕr*, one appointed to superintend others; one who surveys a district of country, etc.; one who views and examines for a particular purpose; a government officer, as the surveyor of taxes. SURVEY'ORSHIP, n. the office of a surveyor. LAND-SURVEYING, the art of measuring and laying out plans of lands or estates. SURVEYOR-GENERAL, a chief or head surveyor. TRIGONOMETRICAL SURVEY, a survey on a large scale by means of a series of triangles.—SYN. of 'survey, n.': review; inspection; retrospect; examination; prospect; landscape.

SURVEY'ING: act or art of determining relative positions of notable points on a surface, as of land, and delineating with due measurements the area included. Land S. may be considered the earliest practical application of the art of geometry or earth measurement; and must have been in some rude form coeval with agriculture and the division or appropriation of the soil. In Rome, S. was one of the liberal arts; and the measurement of lands was intrusted to public officials; and the system practiced by them was probably similar to our plain S. with the chain and cross-staff, and has been handed down to us through the feudal period. Ancient records and title-deeds show areas and boundary-lines of inclosures forming fields, hundreds, town-lands, etc., often laid down with considerable accuracy.

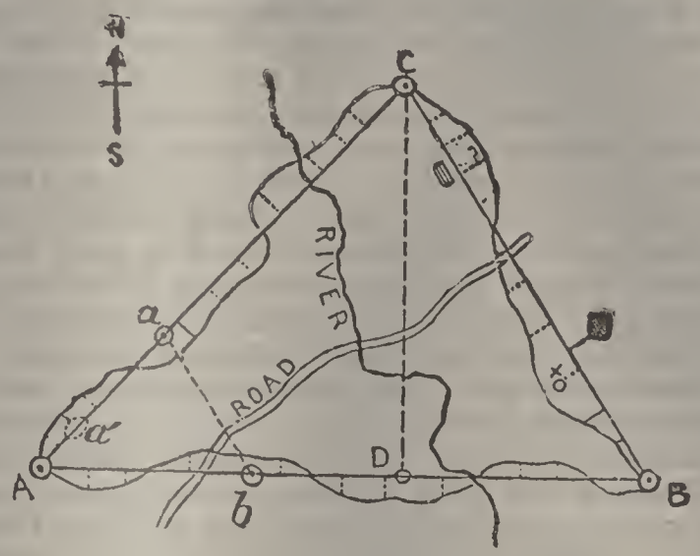
Land S. may be considered under the following heads: (*a*) Plain S. with the chain, and without angular instruments except the cross-staff or fixed angle of 90°. (*b*) Modern engineering S., in which angular instruments are used. (*c*) Coast and military S. (*d*) Trigonometrical S. (q.v.).

The fundamental rule of every description of land S. – from the humble attempt to lay down an irregular garden-plot, to the trigonometrical survey of a large extent of the earth's surface for which the most refined improvements of modern science are indispensable—is simply to determine three elements of a triangle, and thence to calculate its area.

In plain S. with the chain, the three sides of the triangle, ABC, are supposed to be accessible, and are carefully measured on the ground, and then laid down or platted to scale on paper, when an accurate figure of the triangle will be obtained, on which the length of the sides can be marked. To get the area, however, it will be necessary to determine the length of the perpendicular line AD, and this is usually done (when possible) on the ground by means of a simple instrument called a cross, which consists of two sights or fine grooves at right angles to each other, and being placed on the line BC (keeping B and C visible in one of the sights), nearly opposite the angle A, is moved gradually till the angle A is intersected by the other sight. The line AD also can be laid down on the drawing, and its length found by scale, and afterward verified on the ground, or it may be at once laid down on the ground by use of the chain alone. An improved reflecting instrument, called an optical square, is often used for this purpose. Any boundaries along the lines or sides of the triangle, ABC, can be determined by the use of Offsets (q.v.) or insets, as they occur on right and left of line. No matter what the form of the surface to be surveyed may be—polygon, trapezium, or trapezoid—it may thus be determined by a judicious subdivision into tri-



SURVEYING.



PAGE 1.

	To ⊙ C		
	1500		
	1400	6	
	1200	13	
0 8	1000	20	
	900	12	Fence.
	800.		Road.
	700		
8	600		
10	500.		30·0
Mill 8 ft. from line.	400	10	
16	300		
8	200		
5	100		
	0		
From B	L ⊙ B		go to C.
	To ⊙ B		
	2075		
	1950	12	
	1900	15	Fence.
	1800		
9	1600		
8	1500		
	1380		Fence.
	1360		Stream crosses.
	1300	6	Here perpendicular D intersects.
	1275	8	
	1100	12	
	1000	6	Fence.
	900		
	800		
8	700	⊙	b, for proof.
	600		Road crosses.
10	500		
	400		Fence.
	350	12	
	220	14	
	000		
From A			go to B.

PAGE 2.

	To ⊙ C		
	1274		
	500		Road.
	486		Stream.
From D on A	⊙		to C.
	To ⊙ A		
Here a gravel pit, a', 10 ft. diam.	1800		
	1700	5	
	1600.	4	
	1500	7	
	1400	6	
	1300		
6	1200		
8	1100		
12	1000		
9	900		
8	800		
6	700		Fence.
525· to a ⊙	600		
	500	18	Stream.
	400		
	300	5	
	200	6	
	100	8	
	000		
From C	L ⊙ C		go to A.

The line *ao* may be similarly booked and platted, and any lines intersecting shown.

angles; and when the survey is not very extended, and when no serious obstructions exist, chain S. is both accurate and expeditious, especially if proof or tie lines are properly introduced for testing the accuracy of the work

In every kind of S. it is best to make the original triangle as large as possible, and to work from a whole downward, rather than build up a large triangle by addition of several small ones. Many difficulties arise in the practice of S.; and the best test of a good surveyor is the ease with which he overcomes local obstructions, which appear almost insurmountable to a novice, or even to a theoretical surveyor with little field-practice.

Where buildings or other impediments are found in the measurement of a straight line, they are generally passed by the erection of short perpendiculars sufficient to clear the obstacles, and a line parallel to the original measured as far as they exist, after which the original line can be resumed Differences of level, occurring in measuring a line where no instruments are used, are generally compensated or allowed for by the judgment of the surveyor.

In registering the dimensions taken on the ground, such as sides of triangles, offsets, intersections of roads, fences, etc., and everything necessary to make a perfect delineation or plan of the surface, surveyors use a field-book, the mode of keeping which varies with individual practice. Some surveyors use hand-sketches or rough outlines of the form of the ground, and mark the dimensions on them; while others use the ordinary form of field-book, or a combination of the two methods, which perhaps is the best when there are difficult complications, such as buildings, inclosures, water, etc., along the line. In the ordinary field-book, the centre column, beginning from the bottom, represents the length of any line or side of a triangle; and the figures in the column, the distance at which the offsets to the right or left are taken, or where roads, streams, fences, etc., cross the line, or buildings adjoin it. We give above the field-book of the assumed survey of the triangle, ABC, with the different offsets and insets on its sides, and where roads, fences, streams, etc., cross them, the detail of which can be obtained by subdividing the triangle into smaller internal ones. The figure can thus be laid down from the book, and its area calculated by the formula $\frac{AB \times CD}{2}$, and the offsets and insets calculated, added, or deducted, by the methods given in OFFSET.

Ponds, plantations, and inclosures of different kinds may be surveyed with a chain, especially if their form be such that they can be conveniently included in the area of a triangle, the correctness of which being proved by proper tie-lines, the form, area, etc., may be ascertained by offsets, or rather insets from the sides.

SURVEYS, MILITARY OR GOVERNMENTAL: see (for various countries) ORDNANCE SURVEY: COAST AND GEODETIC SURVEY, UNITED STATES; GEODESY: HYDROGRAPHY: TRIANGULATION.

SURVIVE, v. *sĕr-vīv'* [F. *survivre*, to survive—from L. *supervivĕrĕ*, to outlive—from *super*, over; *vivo*, I live]: to live beyond another; to outlive, as a person or thing; to remain alive. SURVI'VING, imp.: ADJ. remaining alive. SURVIVED', pp. *-vīvd'*. SURVIVAL, n. *sĕr-vī'văl*, a living beyond the life of another; in *archæol.*, any habit, usage, or belief remaining from ancient times, whose origin is often unknown, or but imperfectly known. SURVI'VOR, n. *-vĕr*, one who outlives another. SURVI'VORSHIP, n. state of outliving another; in *law*, the right belonging to one of two or more persons, who have a joint interest in an estate, to take possession on the death of the other or others.

SÛRYA, *sôr'ya:* in Hindu myth., the god of the sun. His wife is, in later mythology, *Sûryâ*, who became mother by him of the twin *As'wins*, afterward the heavenly physicians. Besides Sûryâ, he had several other wives, by some of whom he became ancestor of a royal dynasty, called after him *Sûryavans'a*, or the solar race.

SUS-, *sŭs* [L. *sub*]: a prefix, a form of SUB, which see.

SUS, n. *sŭs* [L.; Gr. *hus;* OHG. *sû*, a pig, a swine]: in *zool.*, typical genus of family *Suidæ* or the sub-family *Suinæ:* see HOG (genus).

SUS, *sôs:* territory in Morocco, bounded n. by the Atlas Mountains, e. by Draa, s. by the Asaka river, w. by the Atlantic Ocean; about 11,500 sq. m. It has a mountainous surface, generally good soil, and healthful climate; produces the principal cereals, dates, olives, figs, almonds, grapes, copper, lead, and other minerals; and is peopled by Berbers and Arabs, who are remarkably temperate in habits, but warlike under provocation. The chief city is Tarudant, which is surrounded by a wall with five gates —Pop. of terr. (estimated) 750,000.

SUSA, *sô'sâ:* city of n. Italy, province of Turin, on the right bank of the Dora Riparia, at the foot of the Cottian Alps, 32 m. w. of Turin. It is an episcopal see, and has a cathedral consecrated 1028, with a baptistery of a single block of green marble. Among its other notable buildings are the episcopal palace, the town-hall, and the Borgo de' Nobili. The surrounding country produces wines, fruits, mulberry-trees, and wood. The road over Mont Cenis, opened 1810, begins at S. Pop. (1881) 3,305.

S., called by the Romans *Segusio*, is a very ancient city; it was founded by the Celts, and was in the reign of Augustus the cap. of the Celtic chief Cottius, from whom the Cottian Alps were named; and during the empire was the starting-point for crossing Mont Cenis. A triumphal arch remains, erected by Cottius in honor of Augustus.

SUSA, *sū'sa* [Shushan in Daniel, Esther, etc., derived by some from *shoshan*, a lily]: probably the modern Sus or Shusn, lat. 32° 10′ n., and long. 48° 26′ e.; between the river Chapses or Eulæus (Ulai in Daniel) and the Shapur; anciently the vast and populous capital of Susiana (*Elam* [q.v.] of Scripture, mod. *Khusistan*), one of the most important cities of the ancient world. Its foundation is variously ascribed by writers in antiquity to Darius Hystaspes, or to Memnon, son of Tithonus; and its name, with its ground-plan, is traced on Assyrian monuments at the time of Assur-bani-pal, about B.C. 660. At the time of Daniel's vision 'at Shushan in the palace' (Dan. viii. 2), it was under Babylonian dominion, but came, at the time of Cyrus, under Persian rule; and the Achæmenian kings raised it to the dignity of a metropolis of the whole Persian empire; and Æschylus, Herodotus, Ctesias, Strabo, etc., speak of it as such. At the Macedonian conquest it was still at its height, and Alexander is reported to have found in it vast treasures, with the regalia. After Babylon became the principal city of Alexander and his successors, S. gradually declined, but seems still to have contained enormous wealth at the time of its conquest by Antigonus, B.C. 315. It was attacked by Molo in his rebellion against Antiochus the Great; and during the Arabian conquest of Persia it long held out, bravely defended by Hormuzan. The ruins of its ancient buildings, the palace described in Esther among them, cover about three m.: Greek writers assign to it, with probability, an area of 15 or 20 m. The principal remains consist of four spacious artificial platforms more than 100 ft. high. Traces of a gigantic colonnade with frontage of 343 ft. and depth of 244 were laid bare by Loftus. Cuneiform inscriptions exist, with many other relics similar to those at Persepolis (q.v.: see also CUNEIFORM). The 'tomb of Daniel' shown near S. is a modern Mohammedan building.

SUSANNAH, *sô-zăn'na*, HISTORY OF; or *The Judgment of Daniel*, also *Susannah and the Elders*: titles of a well-known story, one of three apocryphal additions to the Book of Daniel; the other two being *The Song of the Three Holy Children*, and *The History of Bel and the Dragon* (q.v.). It relates how S., wife of Joiachim, and daughter of Hilkiah, celebrated alike for beauty and virtue, was falsely accused of adultery by certain 'lovers' whose advances she had spurned; and how, being condemned to death on their evidence, she was saved by the wise Daniel, who exposed her enemies, and caused them to suffer the fate that they had designed for her. The most probable view of the book regards it as a tradition of some occurrence in the life of Daniel, which has been molded into a moral fiction by a literary artist. The original has from early times been believed to have been Greek and not Hebrew. In most MSS. it precedes the first chapter of the Book of Daniel, and so we find it in the old Latin and Arabic versions; but the LXX., the Vulgate, the Complutensian Polygot, and the Hexaplar Syriac place it at the end of the present Book of Daniel, and reckon it chap. xiii.

SUSCEPTIBLE, a. *sŭs-sĕp'tĭ-bl* [F. *susceptible*, susceptible—from mid. L. *susceptib'ĭlĭs*, ready to undertake—from L. *suscep'tus*, taken hold of, sustained—from *sub*, under; *captus*, taken; *capĕrĕ*, to take]: capable of admitting anything additional, as pain or love; that may receive some change, influence, passion, etc.; tender; impressible; sensitive. SUSCEP'TIBLY, ad. *-tĭ-blĭ*. SUSCEP'TIBLENESS, n. *-bl-nĕs*, or SUSCEP'TIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of admitting something additional; the being capable of receiving some change, influence, affection, or passion; impressibility. SUSCEP'TIVE, a. *-tĭv*, readily admitting.—SYN. of 'susceptibility': feeling; sensation; perception; capability; sensibility; emotion.

SUSCITATE, v. *sŭs'sĭ-tāt* [L. *suscĭtātus*, pp. of *suscitārĕ*, to rouse up—from *sus* for *sub*, under; *cito*, I rouse]: in *OE.*, to rouse; to call into life and action. SŬS'CITATING, imp. SUS'CITATED, pp. SUS'CITA'TION, n. *-tā'shŭn*, in *OE.*, the act of calling into life and action.

SUSIA'NA: see ELAM.

SUSLIK, n. *sŭs'lĭk* [Russ.]: the variegated or earless marmot.

Suslik (*Spermophilus citillus*).

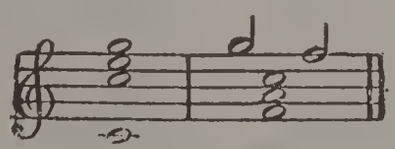
SUSPECT, v. *sŭs-pĕkt'* [F. *suspect*, suspected—from L. *suspectus*, looked at from beneath, mistrusted—from *sub*, under; *spectus*, looked at; *specĕrĕ*, to look at]: to imagine or be of opinion that something exists, but without positive evidence; to doubt; to distrust; to surmise; to imagine to be guilty: N. a doubtful or suspected person; in *OE.*, suspicion; something suspicious. SUSPECT'ING, imp. SUSPECT'ED, pp.: ADJ. imagined without proof; mistrusted. SUSPECT'EDLY, ad. *-lĭ*. SUSPECT'EDNESS, n. *-nĕs*, the state of being suspected or doubted.

SUSPEND, v. *sŭs-pĕnd'* [F. *suspendre*—from L. *suspendĕrĕ*, to suspend—from *sub*, under; *pendĕrĕ*, to hang downward: It. *sospendere*]: to make to hang; to make to depend upon; to attach to something above; to cause to cease for a time; to interrupt; to keep in an undetermined state, as the judgment; to deprive of any privilege or office for a time. SUSPEND'ING, imp. SUSPEND'ED, pp.: ADJ. caused to cease for a time; held undissolved in a fluid; held undetermined; in *bot.*, applied to an ovule hanging from a point a little below the apex of the ovary. SUSPEND'ERS, n. plu. *-ĕrz*, straps for holding up trousers; braces; supports from which things may hang. TO SUSPEND PAYMENT, to cease

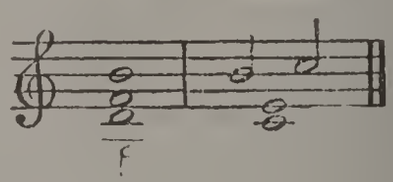
to meet engagements, as a trader or company; to become bankrupt.—SYN. of 'suspend': to delay; hang; intermit; debar; stay; hinder; stop; withhold.

SUSPENSE, n. *sŭs-pĕns'* [L. *suspensus*, pp. of *suspendĕrĕ*, to hang up (see SUSPEND)]: a state of uncertainty; the act of withholding the judgment; doubt; indecision; cessation for a time: ADJ. in *OE.*, held in doubt or expectation: held from proceeding. SUSPEN'SIBLE, a. *-pĕn'sĭ-bl*, that may be suspended or held from sinking. SUSPEN'SIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the capacity of being suspended, or sustained from sinking. SUSPEN'SION, n. *-shŭn* [F.—L.]: the act of hanging up, or causing to hang from, by attaching to something above; act of delaying or withholding, as the judgment; cessation for a time; delay; interruption; intermission; the depriving for a time of power, privilege, or office; the state in which the particles of a solid body are held undissolved in a fluid; in *music* (see below). SUSPEN'SOR, n. *-sêr*, in *surg.*, a bandage to suspend the scrotum; in *bot.*, the cord which suspends the embryo within the ovule and is attached to the radicle. SUS'PENSO'RIUM, n. *-sō'rĭ-ŭm*, the apparatus by which the lower jaw is suspended to the upper jaw. SUSPEN'SORY, a. *-sêr-ĭ*, that suspends: doubtful: N. that which suspends. SUSPENSE ACCOUNT, a lot of bad and doubtful debts collected into one account by a commercial house, or a bank, to be wiped off by certain annual deductions out of profits. SUSPENSION OF ARMS, short truce or cessation of hostile operations, agreed on by contending parties or armies in war, as for burying the dead (see TRUCE). SUSPENSION AND INTERDICT, in *Scots law*, process by which one party seeks to prevent another performing some act, or in general to stay any unlawful proceeding.

SUSPEN'SION, in Music: continuance of a note from one chord to another to which it does not properly belong, and to a proper interval of which it must eventually give way. Thus we have here the note G extended from the first chord into the second, in which it is first suspended, and then resolved into the chord FACF:



. This example is a suspension from above, in which a descent is necessary for its resolution; but a note may be suspended also from below, when it is resolved by an ascent:



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SUSPEN'SION BRIDGE: former port of entry, Niagara co., N. Y.; on Niagara river, 1½ m. below the Falls; and on the Erie, the Grand Trunk, the Michigan Central, the New York Central and Hudson River, and the Rome Watertown and Ogdensburg railroads. It was named from a great railroad suspension bridge across the river, 800 ft. long, 24 ft. wide, with rail tracks and carriageways, since replaced by two others. The Niagara Cantilever Bridge, finished 1883, is another notable structure at this place: see BRIDGE.—The village has U. S. custom-house and post-office, hotels, some factories, and newspapers. Pop. 4,405. Incorporated with Niagara Falls 1892.

SUSPENSION BRIDGES: bridges in which the roadway is suspended from wire cables, or chains, passing over piers or towers, and firmly anchored at their ex-

Fig. 1.

tremities. When the roadway is equally loaded over its length, the curve of the cable is a parabola. The weight of the roadway being known, the strain on the cable, and

Fig. 2.

its requisite strength, are readily determined. E.g., in Fig. 2, if A be the centre of the bridge, and it be required to find the strain on the cable at the point B, it is evident that the weight of the roadway between A and B is supported by the cable at B: we have then to find what strain, in the direction of the length of the cable, will support this vertical load. By the principles of mechanics, if we draw a right-angled triangle BCD, of which the side BC is a tangent to the curve at B, CD is vertical, and BD horizontal; and if the length of CD represent numerically the load on AB, then BC will represent numerically the strain on the cable produced by that load, and BD will be what is called the horizontal component of this strain. This horizontal part of the strain is the same for every part of the curve; it is the total strain on the cable at the centre A, and the strain carried over the towers and balanced by the backstays, which are firmly anchored to the ground behind them. In this manner the conditions of strength and stability of a bridge uniformly loaded are easily determined; but when we have a rolling load heavy in proportion to

the weight of the bridge, e.g., a railway train, the case is very different; for when the train occupies only one-half of the bridge, the cable will be depressed toward that side, and raised at the centre; thus an undulation will be produced in the bridge, which, if the train move rapidly, would endanger its stability. Various combinations have been devised to overcome this difficulty. The most simple, and practically the best, is to stiffen the roadway so that the strain of the passing load is distributed over a considerable length of the cable. In this manner great railway bridges have been constructed. An ordinary suspension bridge is liable to both vertical and horizontal oscillations, the former when a train or other load is passing over it, and the latter due to action of the wind. These oscillations cannot be altogether prevented, but can be so reduced as to be harmless, by use of stays, stretching from the towers and from points on shore to various parts of the bridge. Suspension bridges are generally used in positions where the span is great, and the rolling loads neither great in proportion to the weight of the bridge itself, nor very rapid in their motion.

The suspension bridge principle is very old, and examples have been found in countries having only a limited civilization. The most ancient are found in South America and the East Indies, where ropes of fibre, hide, or tough vines are attached to the trees on the banks of a river or ravine, a rude platform being ultimately suspended, but these are for passengers only. Accidents are frequent on such structures, as the supports give way at intervals.

The use of iron cables for suspension is comparatively recent. The earliest iron chain suspension bridge was thrown across the Tees river, England, in 1741. It was 60 ft. wide. During the 19th century quite a number of suspension bridges were constructed. The first of any magnitude was built over the Menai Strait, between the island of Anglesey and Carnarvonshire in Wales. It has a roadway 100 ft. above the surface of the water and is 580 ft. between the points of suspension. Many others have been constructed in Great Britain and on the continent of Europe. The Union Suspension Bridge near Berwick on the Tweed is 449 ft. long. A suspension bridge on the Avon at Clifton is 702 ft.; one at Frieburg in Switzerland measures 880 ft. from point to point, and another, over the Danube at Budapest, stretches a distance of 666 ft.

In the United States there are many suspension bridges, one of the most notable being that over the Niagara river, for railroads, 822 ft. Seven miles below the falls is a similar structure, measuring 440 ft. from end to end. The New York and Brooklyn Bridge, opened in 1883, has a central main span of 1,595½ ft. with long

spans at either end of 930 ft., making the total length 5,989 ft. This bridge is in five sections for traffic, the entire roadway being 85 ft. in width. The towers at either end are 278 ft. high.

In 1904 the Williamsburg Bridge over the East River, N. Y., was opened. It has a clear span of 1,600 ft. with a total length of 7,200 ft. This bridge is 118 ft. wide and the towers are 235 ft. in height. In 1910 the Manhattan Bridge from New York to Brooklyn was opened; this is the largest suspension bridge in existence. It has a total weight of 42,000 tons, and the length of the wires in the cables is nearly the distance around the earth. The cables have a breaking strain of 215,000 pounds to the sq.in. The construction is practically the same as that of the Brooklyn Bridge, but more massive in every way.

SUSPENSION RAILWAY: a railway in which the carriage is suspended from an elevated cable or track. See STREET RAILWAY.

SUSPICION, n. *sŭs-pĭsh'ŭn* [F. *suspicion*—from L. *suspicĭō* or *suspicĭōnem*, mistrust—from *sub*, under; *specĭō*, I look at]: act of suspecting; imagination of the existence of something upon little or no evidence; doubt; mistrust. SUSPI'CIOUS, a. *-ŭs*, apt to imagine with little or no reason; distrustful; liable or open to suspicion; exciting suspicion; questionable. SUSPI'CIOUSLY, ad. *-lĭ*. SUSPI'CIOUSNESS, n. *-nĕs*, the quality or state of being suspicious; tendency to suspicion—SYN. of 'suspicion': diffidence; distrust; misgiving; fear; jealousy; question.

SUSPIRE, v. *sŭs-pīr'* [L. *suspīrāre*, to draw a deep breath, to heave a sigh—from *sub*, under; *spīrārĕ*, to breathe]: in *OE.*, to fetch a deep breath; to sigh; to breathe. SUSPI'RING, imp. SUSPIRED', pp. *-pīrd'*. SUSPI'RAL, a. *-pī'răl*, a spring of water under the ground supplying a cistern or conduit; a breathing-vent. SUSPIRA'TION, n. *-rā'shŭn*, a deep-drawn breath; a sigh.

SUSQUEHANNA: a river formed by two branches, an eastern or northern, and a western, which unite at Northumberland in Pennsylvania. The eastern branch, which is considered the main stream, issues from Lake Otsego in New York, and has a length of about 250 m. The western branch rises in the western slope of the Alleghanies, and flows very circuitously e.s.e. for about 200 m. The united stream flows s. and s.e., passing Harrisburg and Columbia, enters Maryland, and after a course of about 150 m. flows into the northern extremity of Chesapeake Bay at Port Deposit. The navigation was much obstructed by rapids, but by constructing canals the river has been made navigable for a considerable distance from the Chesapeake.

SUSQUEHANNA COMPANY, THE: in American history a land company formed in 1754, chiefly by Con-

necticut farmers, for the colonization of the Wyoming country. By a treaty with the Five Nations 1754, July 11, an enormous tract of country was purchased for $10,000. It began at the southern boundary of Connecticut and followed in a northerly direction the course of the Susquehanna to northern Pennsylvania. In 1785-6 many disputes arose between the Susquehanna Company and the Pennsylvania claimants of the territory. This was called the 'Pennamite War.'

SUSSEX, *sŭs'ĕks* (South-Saxons): maritime county in s. England, bounded n. by Surrey and Kent, w. by Hampshire; 76 m. long, 28 m. wide; 1,458 sq.m., or 933,269 acres. The South Downs (see DOWNS) traverse the county from w. to e., ending about 20 m. e. of Brighton, in the lofty cliff of Beachy Head. The n. escarpment of the Downs is precipitous, but leads down to the fertile and richly wooded district of the Weald (see DOWNS). A remarkably productive tract, 2 to 7 m. in breadth, extends w. from Brighton along the coast to the Hampshire border; and in the s.e. the rich marshlands, 30,000 acres in extent, that line the coast, give excellent pasture. The Downland, about 50,000 acres, is covered with fine, short, and delicate turf, on which the well-known breed of Southdown sheep are pastured to the number of 300,000. Of the Weald district, formerly covered with dense forests, there are within the county 425,000 acres; a considerable tract has been brought under cultivation. Irrespective of less productive districts, there are in the county 120,000 acres of rich arable land; 150,000 acres are woodland, chiefly in the Weald, and in the Forest Ridge in n.e. Sussex, where are St. Leonard's Forest (10,000 acres) and Ashdown Forest (18,000 acres). The chief rivers are the Arun, Adur, and Ouse, which rise in the n., and flow s. into the Channel. In the s. the climate is mild; and several large towns (see BRIGHTON; HASTINGS) are favorable resorts for seekers of health or relaxation. Seaford and Pevensey Bays are frequented by vessels; and the e. portion of the coast is defended by martello towers. The county has for centuries been divided into the six rapes of Lewes, Pevensey, Hastings, Chichester, Arundel, and Bramber; cap., Chichester.—Pop. of county (1901) 413,232.

SUSTAIN, v. *sŭs-tān'* [OF. *sustenir*—from L. *sustinērĕ*, to uphold—from *sub*, under; *tenĕō*, I hold: F. *soutenir*]: to bear or hold up; to keep from falling; to keep alive; to keep suspended; to maintain; to suffer, as a loss; in *music*, to continue the full time, as a note: N. in *OE.*, that which sustains or supports. SUSTAIN'ING, imp.: ADJ. bearing; upholding; suffering. SUSTAINED', pp. *-tānd:* ADJ. uniform; in *music*, prolonged, as a note. SUSTAIN'ER, n. *-ĕr*, he who or that which sustains. SUSTAIN'ABLE, a. *-ă-bl*, that may be sustained.—SYN. of 'sustain, v.': to prop; bear; support; keep; help; relieve; assist; endure; uphold; subsist; undergo.

SUSTENANCE, n. *sŭs'tĕ-năns* [OF. *sustenance*, sustenance (see SUSTAIN)]: support: food; victuals. SUS'TENTA'TION, n. *-tĕn-tā'shŭn* [L. *sustentātiōnem*]: support; subsistence; that which supports; maintenance: see SUSTENTATION FUND.

SUSTENTACULAR, a. *sŭs'tĕn-tăk'ū-lĕr* [L. *sustentācŭlum*, a prop, a support; *susten'tus*, sustained (see SUSTAIN)]: applied to a kind of connective tissue which serves as a supporting framework to the elements and nourishing blood-vessels of certain organs and tissues.

SUSTENTATION: see under SUSTENANCE.

SUSTENTA'TION FUND, in the Free Church of Scotland: fund for support of its ministers. The system of the Wesleyan Methodists probably suggested the idea to Dr. Chalmers, who devised the scheme, which has continued in operation throughout Scotland. The members of the church are expected to contribute, according to their own will and ability, to a common fund; of which—after payment of expenses, payments to a fund for widows and orphans, pensions to retired ministers, etc.—an equal division is made among the ministers of the church, with a few exceptions, chiefly of newly formed congregations. The amount of the fund has gradually increased from £68,704 (about $334,300) in 1843–4, to £172,408 (about $838,800) in 1880, when out of 1,097 ministers 796 received an equal dividend of £160 (about $780) each, the surplus being divided among the ministers (780) of those charges whose contributions amounted to a certain average sum per member. Congregations are permitted to supplement the stipends of their own ministers, and if able are expected to do so: this supplement in some congregations in towns much exceeds the dividend from the fund; but in many parts of the country the whole or almost the whole stipends of the minsters are paid from the fund.

SUTHERLAND, *sŭth'ĕr-land:* county in the extreme n. of Scotland; bounded e. by Caithness and the North Sea, n and w. by the Atlantic, s. by Ross and Cromarty; 1,297,846 acres. The coast-line is 60 m. in extent; and the shores, rugged on the n. and w., where they are broken by the force of the Atlantic, are comparatively flat on the east. The s. and central regions of S. are the most elevated. The principal mountain peaks are Ben More, in Assynt (3,273 ft.), and Ben Clibrigg (3,158 ft.). The chief rivers ar the Oikel and the Shin. Extensive moors, haunt of herds of red deer, stretch across the county; and the rivers and lakes, the chief of which is Loch Shin (q.v.), form numerous low-lying valleys or straths. In the interior and w. districts, the climate is cold, and the county is often deluged with continuous rains; but in the e. districts the climate is mild, and the soil fertile. In 1880 there were 30,151 acres under crops. Coal, granites of various colors, marble, limestone, etc., are found. The Highland railway passes through the county. Manufactures are inconsiderable. There are good salmon, herring, and white fisheries. S. is well supplied with churches. The school

are well attended, and Gaelic has largely given place to English. Almost the whole of the county belongs to the Duke of Sutherland. The present duke is eminent for his zeal in the improvement of S., spending large sums in reclamation of land, construction of railways, etc.

S. received its name from the Northmen, who frequently descended upon and pillaged it prior to the 12th c., and called it the Southern Land, as being the s. limit of their settlements. The condition of the people of S. before 1811 was miserable. Their sustenance was very precarious and often was dependent on charity. A former Duke of Sutherland effected the 'Sutherland Clearances,' by compelling such of his tenants as could not support themselves either to remove to other districts, where they received land at a merely nominal rent, or to emigrate at his expense to Canada. Pop. of S. (1891) 21,949; (1901) 21,440.

SUTH'ERLAND (GEORGE GRANVILLE WILLIAM SUTHERLAND LEVESON-GOWER), Duke of: born England, 1828, Dec. 19, died 1892, Oct. 6. He was educated at Eton College, sat in the house of commons for Sutherlandshire 1852–61, and succeeded his father, the second duke, 1861. He is one of the wealthiest of British peers; has estates in England and Scotland on which is a pop. of 24,000, and six great residences; is a stockholder in many English and Scotch financial corporations; and is a scientific agriculturist and a practical railroad engineer. In 1881, Apr., he came to the United States to study the railroad systems; subsequently made large investments in Neb. and Fla., and settled in the latter state; and 1889, Mar. 4, was married at Dunedin, Fla., to Mrs. Mary Blair.

SUTLEJ, *sŭt'lĕj*, or SUTLUJ, *sŭt'lŭj:* important river in n.w. India, eastmost of the five rivers of the Punjab; rising in the sacred lakes of Manasarovara and Rawan-Hrad in Thibet; lat. 30° 45 n., long. 81' 15° e. At its outfall from Lake Manasarovara, between 19,000 and 20,000 ft. above sea-level, it is a torrent 30 ft. broad. It flows n.w. 150 m., then, turning s.w., it receives the Spiti or Li, a larger stream than itself. The Spiti is 8,592 ft. above sea-level at its junction with the S., and the scenery is sublime in the highest degree. Continuing s.w., the S. breaks through the mountain rampart of the Himalaya, and after a total course of about 850 m., having been joined by the Beas and the Chenab, it falls into the Indus in lat. about 29° n. Its upper course is supposed to be identical with the Hesudrus, and its lower course (in which it is called the Ghara) with the Hyphasis of the ancients.

SUTLER, n. *sŭt'lĕr* [Dut. *zoetelen*, to do dirty work; *zoetelaar*, a scullion, a sutler: Ger. *sudeln*, to dabble in the wet, to do dirty work; *sudler*, a dabbler]: camp-follower; one who follows an army to sell provisions and liquors. SUTTLE, v. *sŭt'tl*, to act as a sutler. SUT'TLING, imp. *-tlĭng:* ADJ. engaged as a sutler: N. the occupation of a sutler. SUTTLED, pp. *sŭt'tld.*—A *Sutler* is a vender of provisions allowed by the quartermaster-gen. to follow an army in the field, for supplying the soldiers with such luxuries as they

can afford to purchase. Sutlers are under martial law, accompany the baggage on a march, and are narrowly watched, and severely punished if found guilty of any irregularities toward either the soldiers or inhabitants of the country. In the French army a soldier in each regt. is licensed to act as S., and is called *vivandier*. See CANTEEN.

SÛTRA, *sō'trâ* [from the Sanskrit *siv*, to sew—literally, therefore, a thread or string], in Sanskrit Literature: technical name of aphoristic rules, and of works consisting of such rules. The name is perhaps from the strings which fasten together the palm-leaves on which the words are written. The *groundworks* of the whole ritual, grammatical, metrical, and philosophical literature of India are written in such aphorisms; and, in the oldest works, brevity is carried to such an extreme that even the most experienced would find it difficult, sometimes impossible, to understand them without aid of commentaries, which are fortunately never lacking for a work in this style. Some of the more modern Sûtras seem to be imitations of the ancient aphoristic style, but lacking its brevity: the Sûtras of the Buddhists (see PITAKA) are conspicuous for prolixity as compared with the S. of Brahmanical literature.

SUTRO, *sō'trō*, ADOLPH HEINRICH JOSEPH: mining engineer: b. Aix-la-Chapelle, 1830, Apr. 29. He made a special study of mineralogy; came to New York 1850; and soon went to Cal., and engaged in mining with large success. In 1860 he went to Nev., and planned the famous tunnel, bearing his name, through the mountain containing the noted Comstock lode: the work was begun 1869 and completed 1879 (see TUNNEL). S. became very wealthy from the water tolls of his tunnel, and he used his means liberally in beautifying San Francisco, aiding Univ. of Cali. and other state and local institutions. He collected a grand scientific library of more than 200,000 volumes. He died 1898. Aug. 20.

SUTTEE, n. *sŭt-tē* [Skr. *sati*, a virtuous wife—from *sat*, good]: in *India*, the sacrifice of burning a widow on the funeral pile of her husband; the widow who so immolates herself. SUTTEE'ISM, n. *-ĭzm*, practice of self-immolation among Hindu widows.—*Suttee* was a hideous practice which till recent years prevailed in India, of a wife burning herself on the funeral pile, either with the body of her husband, or separately if he died at a distance.

The practice was current in India as early as B.C. 4th c.; and was strangely tolerated by the English rulers till 1829, since which time it has become extremely rare. It is based by the orthodox Hindus on the injunctions of their S'âstras, or sacred books; and various passages in their Purân'as (q.v.) and codes certainly *countenance* their belief of its meritoriousness. Thus the *Brahma-Purân'a* says: 'No other way is known for a virtuous woman after the death of her husband. . . . If her lord die in another country, let the faithful wife place his sandals on her breast, and, pure, enter the fire.' To the same purport, the code of *Vyâsa*. Also the code of *Angiras*: 'That

woman who, on the death of her husband, ascends the same burning pile with him, is exalted to heaven. . . . She shall dwell in a region of joy for so many years as there are hairs on the human body, or 35 millions. . . . The woman who follows her husband to the pile expiates the sins of three generations on the paternal and maternal side of that family to which she was given as a virgin. . . . No other effectual duty is known for virtuous women, at any time after the death of their lords, except casting themselves into the same fire. As long as a woman (in her successive transmigrations) shall decline burning herself like a faithful wife on the same fire with her deceased lord, so long shall she be not exempted from springing again to life in the body of some female animal.' For other quotations, see H. T. Colebrooke, *Digest of Hindu Law*, II., 451 ff. (Lond. 1801); and his 'Essay on the Duties of a Faithful Hindu Widow,' reprinted from *Asiatic Researches*, in his *Miscellaneous Essays*, I. (Lond. 1837). However, *Manu*, who, among legislators of ancient India, occupies the foremost rank, contains no words which enjoin, or even countenance, this practice. Moreover, no injunction of any religious work is admitted by the orthodox Hindus as authoritative unless it can show that it is taken from, or based on, the revealed books, the Vedas (see S'RUTI). An attempt of a Hindu writer has been made in late years to show that, in a certain text, there is a passage justifying S.; but Prof. H. H. Wilson showed that the text cited by the learned Râjâ is of doubtful canonicity; moreover, that a verse in the Rigveda commands the widow to return to her home; and that merely from a misreading of a single word of this verse, arose the interpretation which led to the disastrous injunction of S.: see H. H. Wilson, 'On the Supposed Vaidik Authority for the Burning of Hindu Widows, etc.,' reprinted from *Journal of the Royal Asiatic Society*, XVI., in his Works, II. (Lond. 1862).

SUTTER, *sôt'ér*, JOHN AUGUSTUS: 1803, Feb. 15, 1880, June 17; b. Kandern, Baden: pioneer. He received a milit. education; came to the United States 1834; engaged in trading with Indians and trappers in Santa Fé; crossed the Rocky Mountains to Or. 1838; sailed to the Sandwich Islands, bought a vessel, and took a cargo of merchandise to Sitka; and, while sailing down the coast, was stranded in the Bay of San Francisco, 1839, July 2. Seeking trade in the interior, he founded the first white settlement on the site of Sacramento; and, obtaining a grant of land from Mexico, built a fort and trading-post 1841, and became gov. of the n. district of Cal. In 1848, Feb., James W. Marshall (q.v.), while enlarging the race of S.'s saw-mill, discovered gold. The ensuing rush of miners destroyed S.'s property, and he was soon reduced to poverty. The U. S. supreme court decided against his claims to his land, the federal govt. would grant him no relief; and his later years were spent in Litiz, Penn., on a pension of $250 per month allowed him by the state of California.

SUTTLE, n. *sŭt'tl* [L. *subtīlĭs*, nice, accurate (see SUBTLE)]: the weight of goods after the tare has been deducted; net weight.

SUTTLE, v. See under SUTLER.

SUTURE, n. *sū'tūr* [F. *suture*—from L. *sutūra*, a seam; *sutus*, pp. of *suĕrĕ*, to sew: It. *sutura*]: in *surg.*, the drawing together of a wound by sewing (see below): in *anat.*, seam or joint uniting the bones of the skull (see below): in *bot.*, the part where separate organs unite, or where the edges of a folded organ adhere. SU'TURAL, a. *-tū-răl*, of or relating to a suture; in *bot.*, applied to that form of dehiscence or separation of fruits which takes place at the sutures. SU'TURED, a. *-tūrd*, having sutures. VENTRAL SUTURE, in the *ovary*, that next the centre of the flower. DORSAL SUTURE, that which corresponds to the midrib.

SU'TURE: term in Anatomy and Surgery: also in Botany, denoting the union of separate organs or of adhesion of an organ folded on itself.—In *Anatomy*, suture designates union between the various bones of the cranium and face. A suture is *serrated* when formed by union of two edges of bone with projections and indentations (like the edge of a saw) fitting into one another: the coronal, sagittal, and lambdoidal sutures (see SKULL) are of this kind. A suture is *squamous* when formed by overlapping of the bevelled (or scale-like) edges of two contiguous bones. There are also the *harmonia* and the *schindylesis* sutures, the former being the simple apposition of rough bony surfaces, the latter the reception of one bone into a fissure of another.

In *Surgery*, suture designates various modes of sewing up wounds to hold the opposed surfaces in contact. In passing the needle, the edges of the wound are held in contact with the forefinger and thumb of the left hand;

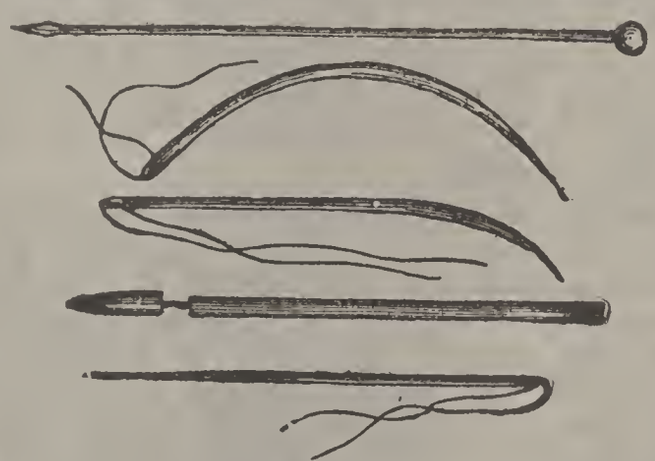


Fig. 1.

and the needle penetrates the surface at about an angle of 50° (rather more than half a right angle), and passes through the whole thickness of the skin at each stitch. The distance from the edge of the wound at which each stitch enters and leaves the skin varies with the depth

of the wound; but there is seldom less than the eighth of an inch between the margin of the wound and the entrance or exit of the needle. Sutures should not include vessels, nerves, muscles, or tendons. The line of the thread should cross that of the wound at right angles. For incised wounds on the surface of the body, when the edges can only be transfixed from the cutaneous surface, or when the opposite margins can both be traversed by one plunge, a curved needle (such as a common packing-needle) is most convenient; whereas a strong straight needle is more convenient for the completely free margins of extensive wounds, such as are left after amputation. Fig. 1 represents various forms of needles used by surgeons; fig. 2 shows the *twisted suture,* as used in the operation for hare-lip, in which the wound is transfixed by pins, around which, beginning with the uppermost, a thread is twisted, in the form of the figure 8. Many varieties of suture are mentioned in surgical treatises, especially sutures for repairing wounds in or uniting the cut ends of the intestines.

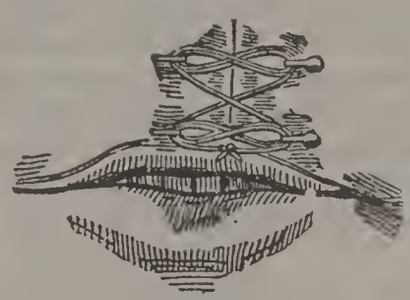


Fig. 2.

SUVA: the capital of the Fiji Islands.

SUVALKI, Russia: in Poland, (1) capital of the government of the same name, on the Czarna-Hancza, near the Prussian frontier, 152 m. n.e. of Warsaw. It contains two churches, municipal buildings, and a large market-place, various schools of primary and grammar grades, two breweries, etc. Pop. (1897) 27,165. (2) The government of Suvalki lies in the extreme northeastern part of Polish Russia. In the n. is covered by thickly wooded plains, and on the Prussian frontier, by forests, swamps, and lakes. The fertile region is at the s. The chief streams are the Niemen, Bohr, Scheschupe and Pissia. Agriculture is the principal occupation. There are numerous factories, including tanneries, distilleries, and mills. There are some schools. Area, 4,651 sq.m. Pop. (1897) 604,945.

SUVOROFF-RIMNIKSKI, Alexander Vasoilievitch (Prince Italieski): a celebrated Russian general: b. in Moscow, according to one account, in Finland, according to another, 1729, Nov. 24; d. Saint Petersburg 1800, May 18. He entered the army as a private, fought bravely in the war against Sweden and by his distinguished conduct during the Seven Years' war gained the rank of colonel (1762). He participated in the suppression of the Polish uprising of 1768-72, capturing Cracow in the first year of the conflict and attaining the rank of major-general. When war with Turkey broke out in 1773, Suvoroff as general of division achieved notable vistories at Turtukai and Hirsuva, and in conjunction with a force under Kainenskvi completed the

overthrow of the Turkish armies at Kosludji beyond the Danube. Subsequently he fought against the pretender Pugatcheff, whose overthrow was largely due to his exertions and made successful campaigns in Crimea, against the Kuban Tartars, and against the mountain tribes of the Caucasus. Upon the renewal of war with Turkey in 1787, he was entrusted with the chief command, and after inflicting decisive defeats upon the enemy at Kinburn, Otchakov and Tokshani, performed the most splendid feat of arms of the entire war by effecting the rescue of the Austrian army under the Prince of Saxe-Coburg, which was surrounded on the banks of the Rymnik by a vastly superior Turkish force which Suvoroff utterly overthrew, gaining thereby the title of Rimnikski and the rank of count. In 1790 he stormed Ismail, where his troops were guilty of the most bloody excesses. Sent in 1794 against the Polish insurgents he gained the title of field-marshal by his storming of the Praga, suburb of Warsaw, and the occupation of the Polish capital. After five years of retirement, he was summoned to take command of the Russian forces which were to coöperate with the Austrians against the revolutionary armies of France in Italy. At 70 Suvoroff was to achieve the most notable triumphs of his career. Arriving in Italy in Apr., 1799, he succeeded within four months in driving the French from the northern part of the country, after he had defeated their armies at Cassano, Apr. 27, on the Trebbia, June 17-19, and at Novi, Aug. 15. Thereupon he crossed into Switzerland to effect a junction with a second Russian army under Korsakoff. The crossing of the St. Gotthard pass was accomplished only after fearful hardships, with the loss of one-third of his army and all his guns. In Switzerland he found that Korsakoff had been defeated by Masséna and that the French were masters of the country. He thereupon began a retreat through the Grisons and Vorarlberg, in which he displayed some of the highest qualities of his generalship. Setting out on the way to Russia, after he had been named commander-in-chief of all the Russian forces with the title of Prince Italieski, he lost the favor of the Emperor Paul before his arrival in St. Petersburg, where after a short ailment he died. Consult Smith, *Suworow's Leben und Heerzüge* (1833-4), also his *Autobiography*, edited by Glinka (1819); and biographies by Polevoi (1853); Spalding (1890).

SUWANNEE, *sū-wâ'nē:* a river in southern Georgia, in the Okefinokee swamp, which flows in a winding, generally s.s.w. course through Florida into the Gulf of Mexico. It is the subject of a popular ballad, called *Way Down on the Suwannee River*. The trainmen, when the cars are crossing this stream, remind the passengers of the old ballad about the river.

SUWARROW, or SUVAROF: a group of islands in the Pacific Ocean, between Samoa and the Manihiki Islands,

is generally included in the Tokelan Islands. It has important pearl fisheries. Great Britain annexed the islands in 1889.

SUZERAIN, n. *sô'zĕ-rān* [F. *suzerain,* a lord paramount, a holder of a fief whence other fiefs depend—from *sus,* above—from L. *sursum,* above]: supreme or highest lord; but in feudal usage, a superior lord to whom fealty is due. According to the feudal system, as developed in n. Europe, every owner of Allodial lands was compelled to acknowledge himself the vassal of a suzerain, and do homage to him for his lands: the term suzerain was applied less to the king than to his vassals, who had sub-vassals holding of them. SU'ZERAINTY, n. *-rān-tĭ* [F. *suzerainetė́*]: paramount authority or command.

SVERDRUP, OTTO: Norwegian Arctic explorer. He went to sea at 17, went with Nansen to Greenland in 1888, and again in 1893, as commander of the Fram, which he brought back to Norway in 1896. He led an expedition to the northern regions in 1898, with the intention of exploring the n. of Greenland. The expedition received its financial support mostly from two brothers of the name of Ringnes, and the Norwegian government renovated and equipped the Fram for his use. On reaching Smith Sound, between Ellesmere Land and Greenland, he found it impossible to force his vessel further n. through the ice, and sent two expeditions to the s.w. across Ellesmere Land, which penetrated a region never before explored, and found in the southern part of Ellesmere Land a large glacier district. Later in 1899 he brought the Fram down to Jones Sound, to the s. of Ellesmere Land, and from there conducted a number of sledging expeditions, exploring the southern and western portions of Ellesmere Land. Sledging westward along the sound was at all times more or less difficult on account of the rugged ice. In many places there were pressure ridges where the ice was heaped high and had to be worked through with pickaxes and spades to make a passage for the sledges; while at other places the ice was comparatively smooth. On the s.e. coast of Ellesmere Land, n. of Jones Sound, a large bay was discovered about 100 m. in breadth and penetrating into Ellesmere. On the northern side of this bay large and complicated fiords are situated. On the w. coast of Ellesmere Land, in about 89° w., a large system of fiords was discovered. The neighborhood around these fiords is probably the part of Ellesmere Land that most abounds in game, musk-oxen, reindeer and wolves being plentiful. To the w. of Ellesmere Land, about 130 m. n. of the Parry Islands, Sverdrup discovered two islands, to the n. and w. of which nothing was visible but rough polar ice. He returned to Norway in 1902. The discovery of the islands and the mapping of the western and southwestern coasts of Ellesmere Land are the most important

results of Sverdrup's expedition. He brought back also a valuable series of meteorological reports, and a representative natural history collection.

SWAB, n. *swŏb* [Dut. *zwabber*, a mop made of rope; *zwabberen*, to dabble, to paddle: Ger. *schwabbern*, to splash]: a mop made of unravelled rope, used on shipboard for cleaning the decks; a mop for cleaning floors; in *sailors' slang*, an awkward person; a lubber; an epaulet: V. to clean or dry with a mop. SWAB'BING, imp. SWABBED, pp. *swŏbd*. SWAB'BER, n. *-bėr*, an inferior officer appointed to see the ship kept clean.

SWABIA, or SUABIA, *swā'bĭ-a*, or SUEVIA, *swē'vĭ-a* (Ger. *Schwaben*, *shwâ'bėn*): ancient duchy, in s.w. Germany; named from a horde of Suevi, who spread over it in the 5th century, and amalgamated with the Alemanni, its previous inhabitants. It existed as a great duchy of the Frank empire till the 8th century, when Alsace and Rhætia were separated from it, and the remainder, retaining its name of Swabia, was thenceforth governed by *nuntii cameræ*, or royal delegates, one of whom, having in 915 usurped the title Duke of Alemannia, was condemned by the German diet, and decapitated 917. Swabia at this time was bounded w. and s. by the Rhine, e. by the Lech (which separated it from Bavaria) and Franconia, n. by the palatinate of the Rhine and Franconia; about 13,000 sq.m. In 918 Swabia was acknowledged as a ducal fief of the empire; and, after changing hands several times, was (1080) bestowed on Count Frederick of Hohenstaufen, founder of the illustrious house of that name, known also as the House of Swabia. Under the rule of this prince and his successors, Swabia became the most rich, civilized, and powerful country of Germany, and the ducal court was the resort of the Minnesingers; but the wars of the Guelphs and Ghibellines, and the quarrel with the French respecting Naples, put an end to the dynasty 1268. The ducal vassals in Swabia rendered themselves almost independent, and professed to acknowledge no lord but the emperor. During these dissensions arose the lordships of Würtemberg and Baden, with numerous lesser states, holding direct of the crown; and opposed to them the cities, which strove for an equal independence, and at last, in reward of important service, obtained 1347 great additional privileges. A number of them united 1376 to make common cause against the neighboring feudal lords (known as the *First Swabian League*); an opposite league was formed 1405 between Würtemberg, Baden, and 17 towns, called the League of Marbach; and both took part in the war of Swiss independence—the former in support of the Swiss, the latter of the Austrians. At last the towns, which had been rapidly increasing in wealth and power, decided at Ulm, 1449, to form a standing army and a permanent military commission, for forcible preservation, if necessary, of peace and order; and the Count of Würtemberg,

the most powerful of the opposite party, having joined them, was appointed military chief of the league, which ultimately grew up into the *Great Swabian League,* and exercised both administrative and judicial authority over the whole country, effectively repressing feudal quarrels. In 1512 Swabia became one of the ten circles into which Germany was divided, received its complete organization 1563, and retained it almost without change till the dissolution of the empire 1806. But during this period, the wars of the towns with Würtemberg, the Peasants' War, of which Swabia was one of the foci, the Thirty Years' War, and those between France and the empire, destroyed the democratic constitution of the towns; and with it their energy, and then their prosperity, disappeared, leaving few relics of their former great political importance.

The name Swabia is now confined officially to a little province in Bavaria (cap. Augsburg), though popularly it is still applied to the extensive districts comprised in the old duchy.

SWABIAN, a. *swā'bĭ-an:* in *geog.,* of or belonging to Swabia. SWA'BIAN LEAGUE, n. league formed against the barons by the cities of Swabia and of the Rhine, 1370. A larger league of this name was formed 1488, under the auspices of Emperor Frederick III., to put down private wars and maintain the public peace. It destroyed more than one hundred and forty castles of nobles and robbers. It was dissolved 1533.

SWAD, n. *swŏd* [connected with *squash* and *squab*]: in *OE.,* a peascod; a handful of pea-straw; a fat, short person; a lout; a rustic.

SWADDLE, v. *swŏd'dl* [from SWATHE, which see]: to bind, as with a bandage; to swathe; in *OE.,* to cudgel; to beat: N. clothes bound round the body. SWAD'DLING, imp. *-dlĭng.* SWADDLED, pp. *swŏd'dld.* SWAD'DLING-BAND, a band or cloth wrapped round an infant. SWADDLING-CLOTHES, the clothes in which an infant is wrapped or dressed. SWADDLING-CLOUTS, OE. for swaddling-clothes.

SWAG, v. *swăg* [Norw. *svaga,* to sway: Ger. *schwanken,* to stagger, totter, falter: Sw. *svag,* weak, bending: Swiss, *schwabben,* to splash, to stagger like a drunken man; *schwägeln,* to stroll about: Bav. *schwadern,* to splash, to bluster]: to sink down by its own weight; to move, as something heavy and pendent; to sway. SWAG'GING, imp., the drawing down of wrought metal to a definite form with or without the use of swage tools. It is the reverse of up-setting: ADJ. swaying heavily. SWAGGED, pp. *swăgd.* SWAGGER, v. *swăg'gĕr,* to bluster; to bully; to brag noisily; to walk in an affected manner, swaying from one side to the other: N. an affected or insolent manner of walking. SWAG'GERING, imp.: ADJ. blustering; exhibiting an insolent or affected manner. SWAG'GERED, pp. *-gĕrd.* SWAG'GERER, n. *-gĕr-ĕr,* one who swaggers; a boastful noisy fellow. SWAG'GY, a. *-gĭ,* de-

pendent by its weight; swaying. SWAG-BELLIED, *-bĕl'lĭd,* having a large belly.

SWAG, n. *swăg* [see SWAG 1]: in *slang,* plunder; booty; money.

SWAGE, v. *swāj* [corrupted from *assuage*]: in *OE.,* to ease; to mitigate; to appease; to quiet.

SWAGE, a. *swāj* [etym. doubt.]: a tool having a face of a given shape, the counterpart of which is imparted to the object against which it is forcibly impressed: V. to shape by means of a swage; to fashion by hammering in a groove or mold of the required shape.

SWAGGER. See under SWAG 1.

SWAHILI, *swâ-hē'lē* [*wa,* people, and Ar. *sáhil,* coast]: inhabitants of the island of Zanzibar and the opposite mainland on the e. coast of Africa, 2°—9° s. lat. They are under the government of the sultan of Zanzibar; and, like their language, are a mixture of native Bantu with Arab, three to one—the latter element giving the Swahili force and intelligence, which have made them traders at large, and their language the only general medium of communication in Africa s. of the equator. The language, however, has several dialects: the Ki-Ngozi, the least Arabic, n. of the Tana river; the Ki-Mvita of the Mombasa district; and the Maneno Unguya of Zanzibar, with the most foreign admixture. Of the last, grammars have been published, and parts of the Bible have been translated into it by Bishop Steere. Missionary effort among this people has not been very encouraging.—The name Swahili is given also to the coast, which is low, warm, and luxuriant in vegetation, with moist winds from the Indian ocean; and abounds with mangroves, tall reeds and grasses, the copal-tree, etc.: it is well adapted to cultivation of the grains, fruits, and spices of warm climates.

SWAIN, n. *swān* [Dan. *svend,* a bachelor: Icel. *sveinn,* a boy, a young man]: a young man employed in husbandry; a rustic; a lover. SWAIN'ISH, a. *-ĭsh,* rustic; churlish.—SYN. of 'swain': peasant; clown; countryman; hind; clod-pole.

SWALE, a. *swāl* [Icel. *svala,* to cool, to refresh; *svali,* coolness]: in *prov. Eng.,* bleak; windy; cold: N. valley or low place; shade, in opposition to sunshine. See YORKSHIRE.

SWALLOW, n. *swŏl'lō* [Icel. *svala;* Dan. *svale;* Ger. *schwalbe;* Dut. *zwaluw,* a swallow]: well-known migratory bird (see below). SWALLOW-TAIL, n. a kind of willow; a swallow-tailed coat. SWALLOW-TAILED, a. narrowing toward the end; forked. SWALLOW-TAILED BUTTERFLIES, butterflies of the family *Papilionidæ,* typical species of which have the hinder wings extended into prolongations called 'tails.' See BUTTERFLIES.

SWALLOW, v. *swŏl'lō* [Ger. *schwelgen*, to guzzle: Dan. *svælge;* Icel. *svelgia*, to swallow: Dut. *zwelgen*, to devour]: to take down the throat; to absorb; to draw or sink into; to engross; to occupy completely; to exhaust; to consume; to employ; to receive or embrace without scruple or examination, as opinions; to bear patiently, as to *swallow* an insult. SWAL'LOWING, imp.: N. act of taking into and down the throat (see SWALLOWING, ACT OF): act of absorbing: receiving implicitly, as a story, etc. SWAL'LOWED, pp. *-lōd*. SWAL'LOWER, n. *-ér*, one who swallows. SWALLOW-HOLES, certain holes or fissures in the mountain limestone of Derbyshire, etc., which frequently receive or swallow up streams that reappear in the low country.—SYN. of 'swallow': to absorb; imbibe; engulf; overwhelm; appropriate; consume.

SWAL'LOW (*Hirundo*): Linnæan genus of birds, of order *Insessores*, tribe *Fissirostres*, now divided into a number of genera, which form the family *Hirundinidæ*. This family consists of birds which prey on insects, catching them in the air, and have great powers of flight, soaring to a great height, or skimming near the surface of the ground or of the water, and wheeling with great rapidity. The bill is short and weak, very broad at the base, so that the gape is wide; the wings are very long, pointed, and more or less sickle-shaped when expanded; the legs are short and weak. The tail is generally forked. The plumage is close and glossy. The species are very numerous, and diffused through almost all countries. Those in colder regions are summer birds of passage, migrating to warmer climates when winter approaches and insects disappear. The European Chimney S. (*Hirundo rustica*) exhibits a character common to many other species, in the very long and deeply-forked tail, the two lateral feathers of which far exceed the others in length. The plumage is very beautiful, the upper parts and a band across the breast glossy bluish black, the forehead and throat chestnut, the lower parts white, and a patch of white on the inner web of each of the tail-feathers except the two middle ones. The whole length of the bird is about 8½ inches, of which the outer tail-feathers make 5 inches. The nest, like that of the American Chimney S., is of mud or clay, formed into little pellets and stuck together, also with straw and bents, and lined with feathers. It is open and cup-shaped, and is generally placed where it is sheltered from wind and rain, e.g., a few feet down an unused chimney, under the roof of an open shed, or in any unoccupied building to which access can be obtained. Two broods are produced in a year. The geographical range of this species extends over great part of Europe, Asia and Africa.—The Window S., or House-martin (*H. urbica*, or *Chelidon urbica*), is another very common Brit. species, glossy black above, white below, and on the rump; feet covered with short downy white feathers, which is not the case in the Chimney S.; tail long, but its outer feathers not remarkably so. The nest is of mud or clay, but is hemispherical, with entrance on the side, and is attached

to a rock, or, very frequently, to the wall of a house, under the eaves or in the upper angle of a window, to the annoyance of housekeepers who prefer the cleanness of their windows to the lively twitter of the birds, and the opportunity of watching their process of nest-building and their care of their young. House-martins congregate in great numbers, as chimney swallows also do before their autumnal migration, and disappear all at once. The house-martin is among the birds of Lapland and Iceland. The only other common Brit. species of S. is the Sand-martin (*H. riparia*), native also to N. America, smaller than either of the preceding, toes naked, tail moderately forked, plumage gray on the upper parts and across the breast, under parts white, and a feathery tuft on the tarsus. It makes its nest in sandy river-banks, the sides of sand-pits, etc., excavating a gallery 18 inches or 2 ft., sometimes 3 or even 5 ft. in length, and more or less tortuous, at whose extremity some soft material is placed for reception of the eggs. This wonderful excavation is accomplished entirely by the bill of the bird. The floor slopes a little upward from the entrance, so that lodgment of rain is prevented. The sand-martin is more local than the other Brit. swallows; but it is distributed over most parts of Europe, Asia, Africa, and N. America.—The other N. American swallows are the Barn S.(*H. horreorum*), lustrous steel-blue above, reddish below, face and throat deep chestnut, and outer tail feathers very long and attenuate; the White-bellied S. (*Tachycineta bicolor*), lustrous green, white below, tail emarginate, the nest in hollow trees, or usurping martin-boxes; the Violet-green S. of the Rocky Mts. and Pacific Slope (*S. Thalassina*), green above, with purple tail coverts, white below—breeding in any cavities; the Cliff S. (*Petrochelidon lunifrons*), above and spot on the throat steel-blue, breast rusty gray, the nest bottle-shaped, on cliffs or under eaves of buildings; the Rough-winged S. (*Stelgidopteryx serripennis*), brownish gray, below paler, the male wing bordered with hooklets; and the Purple Martin (*Progne purpurea*), which is not purple, but blue-black, the female and young streaked below—a species made welcome to boxes or other conveniences for its nests, and regarded as a protector of poultry from hawks (which it pursues), and at the same time as not a dangerous foe of domestic bees, though it lives on similar insects and beetles.—The so-called Chimney S. is a Swift (q.v.). All the above Amer. species are exclusively such, except the Bank S., which is singular as a land bird of both hemispheres. The Fairy Martin (*H. Ariei*), small Australian species, also builds a flask-shaped nest, with the mouth below, attaching it to a rock, or to the wall of a house, and numerous nests are often built close together.—Some of the swallows of tropical countries are much smaller than any European species.—The E. Indian swallows, which make the edible nests (see NESTS, EDIBLE), belong to another family to which the name Swift (q.v.) is given.

SWAL'LOWING, Act of: accomplished by a set of associated movements which have been divided by physiologists into three stages. In the first stage, the food having been duly reduced to a pulp by trituration and insalivation, is carried back by the contraction of various muscles until it has passed the anterior palatine arch: see Palate. Thus far, the movements are purely voluntary. The second stage now begins, during which the entrance of food into the nasal cavities and larynx is most carefully guarded against by certain reflex (involuntary) actions. The tongue is carried further backward, the larynx rises so as to be covered by the epiglottis, which is depressed, and lies horizontally, so that its upper border touches the posterior wall of the pharynx. Coincident with these movements, the sides of the posterior palatine arch contract by muscular action, and approach each other like a pair of curtains, so as almost to close the passages from the fauces into the posterior nostrils; the closure being completed by the uvula. A sort of inclined plane is thus formed, and the morsel slips downward and backward into the pharynx, which is raised to receive it. Very little, if any, voluntary action is here exerted. The third stage—the propulsion of the food down the œsophagus—then begins; and this is effected in the upper part by the constrictor muscles of the pharynx, and in the lower by the muscular coat of the œsophagus itself. At the point where the latter enters the stomach, there is a sort of sphincter muscle, usually closed, but which opens when sufficient pressure is made on it by accumulated food, closing again when this has passed.

SWAL'LOW-WORT. See Asclepias.

SWAM, v. *swăm*: pt. of Swim, which see.

SWAMMERDAM, Jan, Dutch naturalist: b. Amsterdam, 1637, Feb. 12; d. there 1680, Feb. 15. He was educated for the ministry but turned his studies to the profession of medicine. He was devoted especially to the study of insects; and his *General History of Insects* and other works laid the foundations of the modern science of entomology.

SWAMP, n. *swŏmp* [Dan. and Sw. *svamp*, a sponge, fungus: Sw. *svampig*, spongy: Low Ger. *swamp*; Ger. *schwamm*, a sponge, a soft spongy growth: Goth. *swumsl*, a swamp]: a tract of land saturated with moisture, and unfit for agricultural or pastoral purposes, but having a growth of certain kinds of trees—commonly, though erroneously, used as synonymous with bog or morass: V. to plunge or sink in, as in a swamp; to overwhelm and fill with water, as a boat; to plunge into inextricable difficulties. Swamp'ing, imp. Swamped, pp. *swŏmpt*. Swampy, a. *swŏmp'ĭ*, consisting of or like a swamp; wet and spongy. Swamp-ore, a familiar term for bog-iron ore, which occurs in swampy tracts in bands or cakes of

considerable thickness.—SYN. of 'swamp, n.'; bog; marsh; morass.

SWAMP ANGEL: in the American civil war the popular name of an 8-inch Parrott gun, so called by the federal soldiers. It was mounted on a battery constructed on piles driven into the swamp near Charleston, S. C., and was used in the siege of that city. It burst 1863, Aug. 22, and was sent with a lot of old metal to Trenton, N. J. The gun was rescued from its impending fate and set on a granite base on the corner of Perry and Clinton streets in the city of Trenton.

SWAMP DEER, or BARASINGHA: an East Indian deer (*Cervus duvaucelli*), about four ft. in height, rich light yellow in color, found in large herds in moist situations. The antlers are large, with a long beam which branches into an anterior continuation of the main portion, and a smaller posterior tine which is bifurcated.

SWAMPSCOTT, *swŏmp'skot:* town in Essex co., Mass.; on Massachusetts bay, and on the Boston and Maine railroad; about 12 m. n.e. of Boston and 2 m. n.e. of Lynn. The town contains the villages of Beach Bluff, Mountain Park, Phillips Beach, and Swampscott. It is a favorite watering place, and has an excellent beach and good accommodations for transient guests. There are five churches, a town high school, 14 district schools, a public library and several private schools. Pop. (1900) 4,548; (1910) 6,204.

SWAN, n. *swŏn* [Dut. *zwaan;* Dan. *svane;* Ger. *schwan;* Icel. *svanr,* a swan]: web-footed aquatic bird resembling the goose, with very long neck, and remarkable for grace and elegance while swimming (see below). SWAN'UPPING, or SWAN-HOPPING, the custom of catching the tame swans once a year in order to mark them. SWAN'NERY, n. *-nėr-ĭ,* a breeding-place for swans. SWAN-LIKE, after the manner of a swan. SWAN'S-DOWN, the down of the swan; a fine, soft woolen cloth. SWAN-SHOT, a large kind of shot. SWANSKIN, the skin of a swan with the feathers; a kind of fine flannel; a blanket used in printing.

SWAN, (*Cygnus*): genus of birds constituting a very distinct section of the Duck (q.v.) family (*Anatidæ*). They have a bill about as long as the head, of equal breadth throughout, higher than wide at the base, with a soft cere, nostrils placed about the middle; neck very long, arched, and with 23 vertebræ; front toes fully webbed, hind toe without membrane; keel of the breastbone very large; intestines very long, and with very long cæca. They feed chiefly on vegetable substances, as the seeds and roots of aquatic plants, but also on fish-spawn, of which they are great destroyers. They are the largest of the *Anatidæ.* They have a hissing note like geese, which they emit when offended, and they strike with their wings in attack or defense. The common notion, that a stroke of a swan's wing is sufficient to break a man's leg, is

exaggerated. The COMMON SWAN, MUTE SWAN, or TAME SWAN (*C. olor* or *C. gibbus*), is about 5 ft. in entire length, and weighs about 30 lbs. It is known to live at least 50 years. The male is larger than the female. The adults of both sexes are pure white, with reddish bill; the young (cygnets) have a dark bluish-gray plumage, and lead-colored bill. The bill is surmounted by a black knob at the base of the upper mandible, and has a black nail at its tip. In its wild state, this species is found in e. Europe and in Asia; in a half-domesticated state it has long been a common ornament of ponds, lakes, and rivers in all parts of Europe, and in some places in this country. It is an extremely beautiful bird, when seen swimming, with wings partially elevated, as if to catch the wind, and finely curving neck. The ancients called the Swan the Bird of Apollo or of Orpheus; and ascribed to it remarkable musical powers, which it was supposed to exercise particularly when its death approached. It has, in reality, a soft low voice, plaintive and with little variety, heard chiefly when it is moving about with its young. The nest of the swan is a large mass of reeds and rushes, near the edge of the water, an islet being generally preferred. From 5 to 7 large eggs are laid, of dull greenish-white color. The female swan sometimes swims about with the unfledged young on her back; and the young continue with their parents till the next spring. The young swan is now seldom used as food, but in former times it was served up at every great feast, and old books are very particular in directions for its cookery. There is no reason why its rearing for the table should not become extensive.—The POLISH SWAN (*C. immutabilis*), differs from the Common swan in its orange-colored bill, in the smaller tubercle at its base, and in the shape and position of the nostrils; the young also are white, like the adults. It belongs chiefly to n.e. Europe. Many naturalists regard it as the true wild state of the Common swan.—The WHISTLING SWAN, ELK SWAN, or HOOPER (*C. ferus*, or *Olor musicus*) abounds in n. Europe and Asia. Its migrations extend as far s. as Barbary. A few breed in the Orkney Islands, but the greater number in more northern regions. The size is about equal to that of the Common swan, and the color is similar, but the bill is more slender, is destitute of knob, and is black at the tip, and yellow at the base. This bird is frequently brought to the London market. Its names Hooper and Whistling swan are derived from its voice. The anatomical differences between this species and the Common swan are more considerable than the external, particularly in the double keel of the breast-bone forming a cavity which receives a long curvature of the windpipe; and to swans with this anatomical feature the generic name *Olor* should be given; to others, having also a knob on the base of the bill, the name *Cygnus*. BEWICK'S SWAN (*C. Bewickii*), another native

of n. Europe, is about one-third smaller than the Whistling swan.—The AMERICAN SWAN (*C.* or *O. Americanus*) nearly resembles Bewick's swan. It breeds in n. parts of North America and its winter migrations extend only to North Carolina; it has a lateral yellow spot on the bill. The TRUMPETER SWAN (*C. buccinator*) is another American species, breeding chiefly within the Arctic circle, but of which large flocks are seen in winter as far s. as Texas: it is larger than the preceding, and has a black bill. A large crest of horny substance is developed midway on the bill in the breeding season, in some if not all of the species.—The ancients spoke of a black swan proverbially as a thing of which the existence was not to be supposed; but Australia produces, abundantly in some parts formerly, a BLACK SWAN (*C. atratus*), rather smaller than the Common swan, the plumage black, except the primaries of the wings, which are white: the bill is blood-red. It has been introduced into Britain, and breeds freely. The BLACK-NECKED SWAN (*C. nigricollis*) is a South American species, as is the DUCK-BILLED SWAN (*C. anatoides*), smallest of all the species, white, with black-tipped primaries, common about the Strait of Magellan. It is notable that the black color appears more or less in all the species of the southern hemisphere. Swans, according to the law of England, are birds-royal: when partially wild, on the sea and navigable rivers, they are presumed to belong to the crown. The royal birds generally have a mark on them, and the king's swan-herd anciently was an important person.

SWAN, *swân*, JAMES: 1754-1831, Mar. 18; b. Fifeshire, Scotland: revolutionary military officer. He emigrated to Boston at an early age; joined the patriots, took part in the 'tea party,' and was an able aide to Gen. Warren at Bunker Hill, was a captain in Craft's regiment of artillery, and accompanied the expedition that drove the British fleet out of Boston Harbor; and afterward was secretary to the Massachusetts board of war, member of legislature, and adjutant-general of the state. In 1787-95 he lived in France, and became wealthy; 1795-98 lived in the United States; 1798-1815 was engaged in large commercial operations in Europe; and 1815-30 was in a Paris prison on the suit of a German business man. He published, among other works, one against the slave-trade (Boston 1772); *On the Fisheries* (Boston 1784); and *Address on Agriculture, Manufactures, and Commerce* (1817).

SWAN RIVER: river of Western Australia (q.v.).

SWAN RIVER: in Western Australia, a state and colony originally known as the 'Swan River Settlement,' is about 150 m. long. Perth, the capital of the colony, is on the Swan river, and Fremantle is at its mouth.

SWAN, ORDER OF THE: an order of knighthood created in 1440 by the Elector Frederick II. of Brandenburg.

Its headquarters were in a monastery on a hill near Brandenburg and in Ansbach. It was composed of members of the nobility and its object was to encourage more enthusiastic homage to the Virgin Mary, and perseverance in works of mercy. The order was abolished at the time of the Reformation, but was revived by Frederick William IV. of Prussia Dec. 24, 1843, in the form of a free association of men and women of all ranks and creeds for the purpose of alleviating the moral and physical misery of others. Consult: Hanle, *Urkunde und Nachweise zur Geschichte des Schwanenordens* (1874).

SWANEVELT, Herman: Dutch painter: b. Woerden 1618; d. Rome 1690. He set out for Italy when very young, carefully studied the scenery of its beautiful districts, and, captivated by the pictures of Claude Lorraine, became a scholar of this famous master. He equaled, or perhaps surpassed, his master in his figures both of men and animals, and will always hold a first place among the greatest of landscape-painters. His etchings, 116 in number, partly of subjects of his own invention and partly of actual scenery, are very much admired. His pictures, even during his lifetime, brought very high prices.

SWANN, Thomas: 1805-1883, July 24; b. near Leesburg, Va.: legislator. He received a university education; studied law; was secretary to the Neapolitan commission; became director of the Baltimore and Ohio railroad 1836, president 1847; was also president of the Northwestern Virginia railroad; and was elected mayor of Baltimore 1856 and 58. He freed all his slaves before the Civil war, and was a stalwart upholder of the Union; was elected governor of Maryland 1864, and United States senator 1866, but declined the latter, and served as governor till 1869; and was a member of congress 1869-79.

SWANSEA, *swŏn'zē* or *-sē* (Welsh, *Abertawy*): market-town, municipal and parliamentary borough, and seaport of the county of Glamorgan, South Wales; on the right bank and near the mouth of the Tawe; 60 m. w.n.w. of Bristol, 45 m. w.n.w. of Cardiff. The harbor is formed by piers of masonry; projecting from either side of the mouth of the Tawe into the beautiful Swansea Bay, a wide inlet of the Bristol Channel. The vast resources of the coal-field in the midst of which the town is situated began to be explored and turned to commercial account about 1830; and the progress of Swansea has since been so rapid that it is now the most important town in South Wales. The houses and public edifices and institutions are of recent erection. There is a good public hall, and a spacious and well-arranged infirmary. Smelting and refining copper is the staple trade of the town, and the chief source of its prosperity. The coal obtained in the vicinity is peculiarly adapted for smelting purposes; and great quantities of ore are brought hither to

be smelted, not only from the copper mines of Britain, but from Cuba and the w. coast of South America. In the immediate vicinity of the town there are smelting-works, in which about 185,800 tons of copper, copper ores, silver ores, and zinc ores (equal in value to about £4,000,000) are smelted annually. Of the whole amount of copper manufactured in Great Britain, seven-eighths are smelted at Swansea and in its immediate vicinity. There is a large floating dock of 13 acres, lined on its n. side with warehouses. In 1881 a new dock was finished at a cost of £300,000. Swansea has an excellent system of water-works. Patent fuel, a mixture of culm and tar, compressed into the shape of bricks, is an important article of manufacture and trade. There are extensive potteries, and tin, silver, and china works, breweries, rope-walks and tanneries. There are abundant means of communication landward by canals and railways. Pop. (1901) 94,514.

SWAP, v. *swŏp* [imitative of the sound of a blow, hence any sudden movement, as in falling: Low Ger. *swaps,* expressing the sound of a smack, quick: W *chwap,* a sudden blow, instantly: Ger. *schwappen,* to swap]: in *OE.* and *prov. Eng.,* to strike with a hasty sweeping blow; to fall down with sudden violence; *familiarly* (from the notion of a sudden turn), to exchange; to barter: N. a barter; an exchange; in *OE.,* a blow; a stroke: AD. hastily; at a blow. SWAP'PING, imp.: ADJ. in *OE.,* plying the wings with noise; striking the air. SWAPPED, pp. *swŏpt.* See SWOP.

SWAPE, n. *swāp* [a form of SWEEP]: a long pole turning on an upright post, used for raising water from a well; a long oar.

SWARD, n. *swawrd* [Icel. *svördr;* Dut. *zwoord;* Ger. *schwarte,* the thick skin of bacon or pork]: the coat of turf on a grass field, hillside, etc.; in *OE.,* the skin of bacon. SWARDY, a. *swawrd'ĭ,* covered with grass.

SWARE, v. *swär:* the old pt. of the verb SWEAR, which see.

SWARGA, *swăr'gă,* Hind. *swér'ga:* paradise of the Hindu god Indra (q.v.); the residence of some of the inferior gods and deified mortals, who there rest amid many delights in the shade of the five wonderful trees.

SWARM, n. *swawrm* [Ger. *schwärmen,* to make a confused sound, as a multitude in motion: Dut. *zwerm;* Sw. *svärm;* Ger. *schwarm;* Dan. *sværm,* a swarm]: multitude of small animals or insects in motion; especially, a large number of bees seeking a new home, or when collected in a hive; a multitude of people, a great number; a cluster; a crowd: V. to crowd together with confused movements; to collect and depart from a hive in a body, as honey-bees seeking new quarters; to throng together; to be thronged or overrun. SWARM'ING, imp.: ADJ. collecting and moving in a crowded body as bees do; thronging.

SWARMED, pp. *swawrmd.*—SYN. of 'swarm, n.': throng; mob; multitude; populace.

SWARM, v. *swawrm* [O. Fris. *swerva,* to crawl: Dut. *swermen,* to wander about: perhaps connected with *squirm*]: to climb the bole of a tree by the alternate twisting of the arms and legs around it; to wriggle about.

SWARM'ING, in Botany: peculiar mode of reproduction observed in some *Confervaceæ, Desmideæ,* etc. The granules which form the green matter in the plant, or in one of its joints, become detached from each other, and move about in the cell with great rapidity. The external membrane swells in one point, and finally bursts there, when the granules escape into the surrounding water to become new plants. At first, they issue in great numbers, but those which remain last move about within their cell for a long time before they find the way out. Their motion is supposed to be due to cilia. After escaping, they continue their movements for some time, and most of them finally become grouped together in little masses on some substance before beginning to vegetate.

SWART, a. *swawrt,* or SWARTH, a. *swawrth* [Goth. *svarts;* Icel. *svartr;* Dan. *sort;* Ger. *schwarz,* black]: darkly brown; somewhat black; tawny. SWART, v. to blacken; to make dusky. SWART'ING, imp. SWART'ED, pp. SWARTH, n. *swawrth,* in *OE.* and *prov. Eng.,* apparition of a person about to die. SWARTHY, a. *swawrth'ĭ,* being of a dark or dusky complexion; tawny. SWARTH'ILY, ad. *-lĭ.* SWARTH'INESS, or SWART'INESS, or SWART'NESS, n. duskness or darkness of complexion.

SWARTH, n. *swawrth:* OE. for SWATH; also for SWARD, turf.

SWARTHMORE, *swârth'mōr,* COLLEGE: located at Swarthmore, Pa. It was founded by the liberal (or Hicksite) body of the Society of Friends, and was first opened in 1869. The main building was destroyed by fire in 1881, but was immediately rebuilt. The college now confers regularly but one baccalaureate degree, that of A.B. This was the original custom until 1874, when the practice of conferring the three degrees of A.B., B.S., and B.L., and the special degree of bachelor of science in civil engineering was adopted; in 1903 the college returned to its first practice. Courses in engineering and mechanic arts are offered, and provision is made for a special course leading to the degree of bachelor of science in civil engineering. The A.B. course includes certain prescribed studies, one major study in any one department in which three full years of college work must be completed, and electives to complete the required number of hours. The prescribed studies include English, Bible study, history or economics, at least one language and one science, and mathematics, or engineering. In the departments of biology, chemistry and physics courses are planned to prepare for the study of medicine. The

degrees of master of arts and civil engineer are conferred for graduate work. Swarthmore has been from the first a coeducational college, being the second institution east of the Alleghany Mountains to offer instruction to men and women on absolutely equal terms. Though it is a small college, and not a university, it is especially well equipped for an institution of its size, especially in the science and engineering departments. It has a campus comprising more than 200 acres, bordered by the gorge of Crum creek, and including the farm on which Benjamin West, the artist, was born. The buildings are Parrish Hall (the main building); Science Hall; the observatory; the two gymnasiums; the president's house and residences of the professors; Wharton Hall (a new dormitory); and a new chemical building There are two fellowships and 17 scholarships. The library contains 34,000 volumes, including the Friends' Historical Library. The students number 325 and the faculty 36.

SWARVE, v.: OE and Scot. for SWERVE.

SWASH, n. *swŏsh* [prov. Sw. *svasska*, to make a 'swashing' noise: Sw. *svassa*, to swagger: Norw. *svaga*, to sway (see also SWAG 1)]: the noise made by a liquid flowing with violence; blustering; a swaggerer; in *arch.*. a figure whose circumference is not round but oval; wash: V. in *OE.*, to bluster; to splash; to make a clatter or great noise. SWASH'ING, imp.: ADJ. having the character of a bully; crushing. SWASHED, pp. *swŏsht.* SWASH'ER, n. in *OE.*, one who makes a show of valor or force of arms. SWASH'BUCK'LERS, n. *-bŭk'lérz*, in *OE.*, swaggering boastful fellows—said to be so named from the clanking noise made with their swords and bucklers or shields. SWASHY, a. *swŏsh'ĭ*, soft and moist, like fruit too ripe.

SWAS'TIKA: a symbol of the sun in the nature-religions of Aryan races from Scandinavia to Persia and India; and similar devices occur in monumental remains of the ancient Mexicans and Peruvians, and on objects exhumed from prehistoric burial mounds within the limits of the United States. The Swastika consists of a Greek cross, either enclosed in a circle the circumference of which passes through its extremities ⊕, or with its arms bent back thus 卐, and as it is found invariably associated with the worship of the Aryan sun-gods (Apollo, Odin), it is believed to represent the sun.

SWAT, India: a territory or district of the northwest frontier province, occupying the valley of the Swat river, north of Peshawar and south of Chitral. It was well known to the ancients, but seldom visited by Europeans until the uprising of the frontier tribes in 1895. It is a narrow valley between lofty mountains, and inhabited by industrious, liberty-loving Afghan tribes.

SWATCH, n. *swăch* [see SWATH]: in *Scot.*, a pattern, as of cloth; in *OE.*, a swath.

SWATH, n. *swawth* [Ger. *schwad;* Dut. *zwade;* Low Ger. *swad,* the line of grass left by the mower: prov. Eng. *swaff,* as much grass as the scythe cuts at one stroke]: the line or row of grass as it lies on the left of the mower, cut by his scythe; the whole breadth or sweep of the scythe or mowing-machine; a bandage or fillet.

SWATHE, v. *swāth* [from SWATH, which see]: to make a bundle of; to tie up in bundles; to bandage; to wrap: N. a bandage or fillet. SWATH'ING, imp. SWATHED, pp. *swāthd.* SWATHING-CLOTHES, swaddling-clothes.

SWATOW, *swâ-tow',* or CHAU-CHOU: seaport town on a sheltered bay on the coast of China, province of Quang-tung, 212 m. e.n.e. from Canton. It is one of the ports opened to foreign trade by the treaty of Tien-tsin, and has a resident British consul. The trade is increasing: half of the total is direct trade with foreign ports. Opium is the chief import, next are cotton and woolen goods, metals, and cotton yarn. The chief exports are sugar, rice, tea, and paper. Pop. (1901) 38,000.

SWAY, v. *swā* [Dut. *zwaaijen,* to swing, to brandish: Icel. *sveigja,* to bend: Norw. *sviga,* to bend or give way: Dan. *svaie,* to swing to and fro]: to move backward and forward freely in the hand; to wave or swing; to influence or direct by power or force; to bias; to hang in a heavy unsteady manner; to lean to one side; to have influence; to bear rule; to govern: N. the swing or sweep of a weapon; the motion of a thing moving heavily; influence; power exerted in governing; any weight or authority which inclines to one side. SWAY'ING, imp. SWAYED, pp. *swād.*—SYN. of 'sway, v.': to bias; rule; overpower; influence;—of 'sway, n.': power; rule; empire; dominion; weight; preponderance; direction; control; ascendancy.

SWAYNE, *swān,* NOAH HAYNES: American jurist: b. Culpeper co., Va., 1804, Dec. 7; d. New York 1884, June 8. He was admitted to the bar in 1823; settled in Coshocton, Ohio, in 1825; and was prosecuting attorney of the county in 1826-9. In the latter year he became a democratic member of the legislature. He was United States district attorney for Ohio in 1831-41. He was an associate justice of the United States supreme court in 1862-81. In the latter year he resigned owing to advanced age.

SWAZILAND, South Africa: a native state between the Drakensberg and Lobombo ranges, on the borders of the Transvaal. Its surface is mountainous but fertile, and it is thought to contain rich gold and coal deposits. It possesses fine prairies, which offer fine pasturage, especially in winter. There are also extensive forests which contain fine timber—a rarity in South Africa. Water is plentiful, the climate is healthful. The Swazis are a Zulu tribe and were subject to the intrigues of Great Britain and the Transvaal. The Boers obtained

supremacy in 1895, which passed with their conquest and annexation by England in 1902. Area, 3,000 sq.m. Pop. estimated at 70,000 or 80,000.

SWEABORG, or SVEABORG, *svā'â-bōrg:* great Russian fortress in Finland, sometimes called 'the Gibraltar of the North,' protecting the harbor and town of Helsingfors, 2 m. distant. The fortifications extend over seven islands, the *Nylandischen Skären;* but the grand central point is the island Wargöe. The islands are connected by bridges, and between two of them lies the single narrow entrance to the harbor, which can hold 70 or 80 ships of the line. The greater part of the inhabitants are manual laborers, ship-carpenters, and traders: its garrison numbers about 5,000 (including women and children). During the Crimean war, the Anglo-French fleet in the Baltic made a reconnaissance of the place, and bombarded it for two days, 1855, Aug. 9, 10; but found the defenses too formidable to be reduced by the means at their disposal. Civic pop. about 3,000.

SWEAL, v. *swēl* [Icel. *svæla,* thick smoke: Ger. *schwelen,* to burn slowly (see also SULTRY)]: to melt wastefully away, as candles; to singe, as a hog. SWEAL'ING, imp. SWEALED, pp. *swēld.*

SWEAR, v. *swär* [Icel. *sverja;* Dan. *sværge;* Ger. *schwören,* to affirm with an oath: Icel. *svara,* to answer: Goth. *svaran,* to swear: OHG, *wâr;* Ger. *wahr,* certain, assured: Low Ger. *waren,* to prove by witnesses or documents]: to affirm on oath; to appeal solemnly to God for the truth of what is stated; to administer an oath to; to declare a promise upon oath; to give evidence upon oath; to use profane language, or use the name of God irreverently; to obtest by an oath; to vow; in *OE.,* simply, to aver; to affirm. SWEAR'ING, imp.: ADJ. affirming upon oath; causing to swear: N. the act of affirming on oath; profane or irreverent language (see SWEARING, PROFANE). SWORE, pt. *swōr,* or SWARE, in *OE.,* pt. *swär,* did swear. SWORN, pp. *swōrn,* affirmed on oath. SWEAR'ER, n. *-ėr,* one who swears; one who habitually uses profane or irreverent language.

SWEARING, PROFANE: the use of oaths in a light and familiar manner by way of asseveration or emphasis. As popularly understood, 'profane swearing' involves also many terms of a gross and obscene character. Profane swearing and cursing are made punishable in England by the act 19 Geo. II. ch. xxi., which prescribes a graded tariff of penalties for offenders according to their social rank: for each profane oath or curse a laborer, soldier or sailor incurs a penalty of a shilling; other persons under the rank of gentleman two shillings; a gentleman or any one above that rank, five shillings. In several of the states of the American Union profane swearing is variously declared punishable by the statutes.

SWEAT, n. *swĕt* [Icel. *sveiti;* Dut. *zweet;* Dan. *sved;*

AS. *swát*, sweat: Skr. *svaidas*, sweat: L. *sūdor*, sweat]: the moisture which appears on the skin of animals in hot weather, or during severe exertion or labor (see below): also generally, moisture exuding from any substance, e.g., *sweat* from hay; toil; labor; drudgery: V. to give forth moisture through the pores of the skin; to cause to perspire; to shed; to exude; to toil; to drudge; in *slang*, to fleece or bleed, as a sharper his victim. SWEAT'ING, imp.: ADJ. giving forth moisture from the skin: N. the act of making to sweat; a kind of fermentation in the manufacture of tobacco-leaf; a process of fraudulently lessening the weight of gold coins by shaking them in a bag; the employment of working tailors in their own homes at low wages. SWEATING or SWEATING-ON, the soldering of metallis surfaces without the aid of a copper bit. After being thoroughly cleaned the surfaces are heated and covered with a film of solder. Then they are brought together and heated until the solder flows and unites them. The method is often employed to hold together temporarily various kinds of work which has to be turned or shaped, and which could not be conveniently held in any other manner. The subsequent separation of the parts is easily accomplished by the aid of heat. SWEAT, or SWEATED, pt. and pp. *swĕt* or *swĕt'ĕd*. SWEAT'ER, n. *-ėr*, one who or that which causes to sweat; a middleman between slop-sellers and working tailors, abusively applied. SWEAT'Y, a. *-ĭ*, moist and sweat; laborious; toilsome. SWEAT'ILY, ad, *-lĭ*. SWEAT'INESS, n. *-nĕs*, the state of being sweaty. SWEATING-BATH, a hot bath which puts the body into a violent state of perspiration. SWEATING-ROOM, a room for maturing cheese. To SWEAT COIN, to take away part of it by a process of friction without actual defacement.

SWEAT, or PERSPIRATION: moisture exuding through the pores of the skin. For the nature, composition, and uses of this fluid in the normal state, see SKIN. In the physiology of sweat, it is to be noted that the composition of the fluid varies materially according to the part of the body from which it is secreted. Thus, the sweat of the feet is more abundant in fixed salts than that of the arm, in the ratio of 5 to 3. The sweat-glands, like the lungs and kidneys, act as depurating organs, and separate and carry off effete matters from the blood (see SKIN): this eliminating action of the skin is modified in various diseases; in some cases being diminished, as in the early stage of fevers, in scurvy, diabetes, sun-stroke, etc.; and more or less increased in the sweating stage of ague, in acute rheumatism, in Asiatic cholera, in certain adynamic fevers, in advanced stages of pulmonary consumption. The sweat is naturally acid in health, but in prolonged sweating the secretion becomes neutral, and finally alkaline. Little is known regarding the coloring matters of sweat. In cases of jaundice the sweat sometimes communicates a yellow tinge to the body-linen;

and instances of blue, red, and bloody sweat are on record. Cases of unilateral sweating, stopping abruptly at the middle line, have been occasionally noticed. For profuse perspiration, hot water is a remedy—serviceable in (1) oversweating in good health and hot weather; (2) undue sweating in special parts of the body, as the hands, feet, or armpits; (3) true hectic sweats; (4) ordinary night sweats in phthisis not preceded by hectic symptoms. To be of service, the water must be applied at as great heat as the patient can possibly bear.

SWEATING SICKNESS, THE: extremely fatal epidemic disease, which ravaged Europe, especially England, in the 15th and 16th centuries. It appeared first 1485, in the army of Henry VII., shortly after his arrival at Milford in South Wales from France, and in a few weeks it spread to the metropolis. It was a violent inflammatory fever, which, after a short rigor, prostrated the vital powers as with a blow; and amid painful oppression at the stomach, headache, and lethargic stupor, suffused the whole body with a fetid perspiration: all this took place in a few hours, and the crisis was always over within a day or night. The internal heat was intolerable, yet every refrigerant was certain death. '*Scarce one amongst a hundred* that sickened did escape with life.' Holinshed, III. 482. Two lord mayors of London and six aldermen died within one week; and the victims mostly were robust men. It lasted in London from Sep. 21 (or 15) till the end of October, during which short period 'many thousands' died from it. The physicians could do little or nothing to combat the disease, which at length was swept away from England by (as many supposed) a violent tempest on New Year's day. It reappeared in London in the summer of 1506, but seems to have been not very fatal. 1517, it again broke out in London in most virulent form; carrying off its victims in two or three hours. In many towns a third, or even a half of the inhabitants were swept away. This epidemic lasted about six months. In 1528—the year in which the French army before Naples was destroyed by pestilence, and in which the putrid fever *Trousse-galant* decimated the youth in France—the sweating sickness again broke out in London, spread rapidly over the kingdom, and 14 months later, brought a scene of horror upon all the nations of n. Europe, scarcely equalled in any other epidemic. How many lives were lost in this epidemic, which has been called by some historians *the great mortality,* is unknown. In the following summer (1529), having apparently died out in England, it appeared in the chief German cities; and in September in the Netherlands, Denmark, Sweden, and Norway; then in Lithuania, Poland, and Livonia—numbering its victims by thousands. After 23 years it appeared for the last time, breaking forth 1551 in Shrewsbury, England, where, in a few days, it killed 960 persons.

SWEDEN, *swē'den* (*Sverige*): eastern and southern portion of the Scandinavian Peninsula (see SCANDINAVIA), constituting the independent Kingdom of Sweden: 55° 20′—69° 3′ n. lat., and 11°—24° e. long.; bounded n. and W. by Norway; extreme s.w. and s. by the Cattegat, which separates it from Denmark; s.e. and e., as far as 66° n. lat., by the Baltic and the Gulf of Bothnia; and thence to the extreme n. by Russia; greatest length n. to s. 986 m., breadth 250 to 286 m.; nearly 171,000 sq. m. S. is divided into three provinces—Norrland, largest and most northern; Sweden Proper, or *Svea-rike* (land of the Swedes), in the centre: and Götland or *Góta-rike* (land of the Goths) to the south.

Population.—The pop. is mainly rural. Pop. (1904, 2,566,934 males, 2,693,877 females). The chief cities were Stockholm, the cap. (317,964), and Gottenborg (138,030). The Swedes belong, with Danes, Norwegians, and Icelanders, to the Scandinavian branch of the Teutonic stock. The following are the 25 län (districts) into which the province of the Kingdom are subdivided: Stockholm, Upsala, Södermanland, Ostergötland, Jönköping, Kronoberg, Kalmar, Gotland, Blekinge, Kristianstad, Malmöhus, Halland, Göteborg and Bohus, Elfsborg, Skaraborg, Vermland, Orebro, Vestmanland, Kopparberg, Gefleborg, Vesternorrland, Jemtland, Vesterbotten, Norrbotten, City of Stockholm, Lakes Vener, Vetter, etc., containing a total of 172,876 sq. m., and a population of about 5,200,000. In 1878 S. ceded her only colony, St. Bartholomew (q.v.), to France (to which country it had formerly belonged) on payment of the purchase-money agreed on.

Unlike Norway, S. has a few high mountains, but contains numerous large lakes. The coast of the Baltic, and the adjoining islands, are mostly low and sandy, though in some parts, as in the vicinity of the outlet of Lake Maelar into the sea (about 58° n. lat.), the shores are steep; and on the s. and w. coast, the generally low, alluvial lands are replaced by more rocky formations.

In the n. parts, the land rises gradually from the Gulf of Bothnia to the Kjölen range, belonging to the great Norwegian Fjeldmark which constitutes the true watershed and natural boundary between S. and Norway. South of 62° n. lat., the slope is directed s., attaining its lowest level in the vicinity of the three great lake Vener, Maelar, and Hjelmar, which with the great Vetter Lake, nearly intersect the country from e. to w.; and s. of these great inland waters, the surface is in general level, though ranges of high ground and detached hills occur.

S. may be divided into three distinct parts—the n. or alpine region, the central or lake district, and the s. or mining district. The extreme s. includes the only level and fertile tract, in which wheat can at all times be advantageously cultivated. The lakes of S. have been computed to cover nearly ⅛ of the entire area of the country:

the largest are Lake Vener, Lake Vetter, and the Maeler Lake (q.v). The rivers are generally short and rapid, and made navigable only by art: the largest is the Angermann Ely, flowing into the Gulf of Bothnia. The Cattegat is connected with the Baltic by an admirable system of canals, etc.

Temperature, Climate, etc.— The differences of climate in S. are necessarily very great, considering that its most northern parts are more than 2° within the polar circle, and its s. extremity 11° s. of it, besides which many districts are so nearly surrounded by seas and lakes as to have the conditions of an insular position. Great extremes of temperature are common in different parts of S.: thus, while Stockholm has a mean annual temperature of 42°·2 Fahr., and Gottenborg 46°·3, the summer temperature of Stockholm is 60°·4 Fahr., and that of Gottenborg 62°·13; and the winter temperature of Stockholm only 25°·8, and that of Gottenborg 31°·5 Fahr.

Agriculture, Forestry and Stock Raising.— The heat of the summer, scarcely separated from the cold of the winter by spring or autumn in extreme n. districts, enables the inhabitants to cultivate barley, which is reaped within two months of the time of its sowing, though even the hardier cereals, as oats and rye, will not ripen above the parallel of 66° n. lat. The principal articles of cultivation besides various cereals, are potatoes, hemp, flax, tobacco, and hops, generally in sufficient quantities for home consumption. The forests are of great extent, covering nearly one-fourth of the entire surface, and in some places 3,000 ft. above sea-level. The birch, fir, pine, and beech are of great importance, not only for the timber, tar, and pitch which they yield, but also for supplying charcoal and firewood. Above the parallel of 64°, stunted bushes, berries, dwarf-plants, and lichens are the only forms of vegetation. The common fruit-trees, e.g., cherries, apples, and pears, grow as far n. as 60°, but the fruit seldom comes to perfection except in the s. provinces; cranberries and other berries abound, however, in all parts of the country. Bears and beavers, formerly numerous, are becoming scarce; but wolves, lynxes, foxes, martens, squirrels, eagles, reindeer in the Lappmarks, etc., are still common; while the elk and deer are found in some of the forests, which also abound in hares, woodcocks, blackcock, and various other small game; and Lemmings (q.v.) occasionally descend from the mountains in large numbers, and lay waste the low country. The lakes yield great abundance of fish, 88 different kinds of sea and freshwater fish being brought to market. In 1903, there were in S. 546,407 horses, 2,586,204 head of cattle, 1,167,473 sheep and lambs, and 816,479 swine.

Mining.—The product of the mines, 1904, included 4,083,-945 tons of iron-ore; 520,250 tons of pig iron; 8,187 tons of silver and lead ore; 36,834 tons of copper ore; 57,634 tons of zinc ore; 2,297 tons of manganese and

15,957 tons of sulphur and pyrites; 320,984 tons of coal were mined in 1904, 30,869 men being employed in the coal mines. Next to agriculture, mining is the most important national industry, and in some provinces is the principal employment. The Danemora mines, in Upsala län, yield a metal capable of being converted into the finest steel, and which mostly is purchased for the English market. At Gellivare in south Lapland, enormous quantities of iron ore of superior quality have recently been extracted from mines, which promise to rival those in Upsala.

Manufactories.—S. (1903) had 1,259 saw mills, employing 42,831 persons. There are also 411 furniture factories, 136 wood-pulp factories and 65 for making paper and paste board.

Shipping.—In 1903, 1,983 sailing vessels, with a tonnage of 271,852 and 987 steam vessels, with a tonnage of 375,999 carried the Swedish flag; 115,159 ships and boats passed through the canals of S. during 1903.

Exports and Imports.—The chief articles of export are, in the order of value: timber (beams, deals, masts, spars, pit-props), iron and steel, oats and barley, butter, lucifer matches, cattle, sheep, swine, paper, wood-pulp, copper and zinc-blende. The imports are mainly coal, coffee, sugar, rye and flour, woolen manufactures and wool, dressed skins, herrings, mineral oil, machinery, pork, salt, spirits, and tobacco. Less than half the total exports (1888) went to Great Britain, the countries next in order being Denmark, France, Germany, Norway, Holland, Belgium, Spain, Finland, Mediterranean ports, Russia, Austria, Portugal, and the United States. About a fourth of the imports were from Germany, Great Britain sending nearly as much; next were Denmark, Norway, Russia, Belgium, Finland, Netherlands, France, United States, E. India, Portugal, and Spain. Total imports, including precious metals, (1903), $140,000,000; exports, nearly $100,000,000, one-half being to Great Britain.

Revenue, etc.—The revenue is from direct and indirect taxation, state property, railways, customs, etc. The budget for 1903 gave the annual receipts at $46,566,409, and the expenditure at about the same amount. The frequent surplus of expenditure, due almost invariably to the prosecution of national and public works, is formally sanctioned by the diet, which annually provides means for covering the deficit by appropriation of certain state funds for the purpose, and by levying a general income-tax. The national debt 1905, Jan. 1, was about $95,000,000.

Army, Navy, etc.—The Swedish army has a peculiar organization; as it consists, in addition to the Värfvade or enlisted troops, of the 'Indelta,' or cantoned militiamen, maintained at the cost and on the property of the landed

proprietors: each estate being mulcted according to its value or extent to maintain one or more men, and provide them with 'torps' or cottages, a certain portion of land, and a fixed rate of payment. In return, these reserve soldiers, mostly married men, serve the proprietor as field-laborers in times of peace, except when called out for drill. In time of war, they can be sent with the companies in which they are enrolled into active service, and they are then paid by the crown. The regular army, 1902–3 (peace strength) consisted of 2,217 officers, 1,718 n. c. officers and 30,385 men, with 240 guns and 9,808 horses. The navy, maintained wholly for coast defence, comprises 7 turret ships, 5 other armored ships, 5 torpedo boats, 1 destroyer of 31 knots, 26 tor. boats and 1 submarine. There are also several gunboats and train. ships and 11 monitors for coast service. Including the reserve there are 382 officers.

Form of Government.—S. is a hereditary and constitutional monarchy, based on the fundamental law of 1809, by which it was decreed that the succession should be in the male line; that the sovereign should profess the Lutheran faith; and have sworn fidelity to the laws. The diet, which meets every year, for a session of three or four months, is composed of two chambers, both elected directly or indirectly by the people. The first chamber consists of 150 members, who receive no pay, and are elected for nine years by the communal authorities: they must be possessed of an income of about $1,000 and have attained the age of 35. The second chamber is composed of 230 members elected for three years by direct suffrage in cities and towns, and direct or indirect in rural districts, as the majority decides; and receiving payment for their attendance during each session of the diet, and for their travelling expenses. The diet exercises strict control over the expenditure of the revenue, fixes the budget, and has power to take cognizance of the acts of the ministers and crown officers. The king is the supreme head of the law courts, nominates to all appointments, can declare war, make peace, and conclude foreign treaties. He is assisted by a council of state composed of ten members, responsible to the diet.

Religion.—The predominant form of religion in S. is the Lutheran. The affairs of the national Lutheran church are administered by 1 archbishop (of Upsala) and 12 bishops, whose dioceses included (1905) abt. 2,576 parishes. Since 1880 there has been a noticeable growth of Prot. dissent: see SWEDISH DISSENTING CHURCHES.

Literature.—For the ancient literature of Sweden see SCANDINAVIAN LANGUAGE AND LITERATURE: for its ancient religion, see SCANDINAVIAN MYTHOLOGY. The language is one of the main branches of the old Scandinavian, like the Danish Language (q.v.) and that of Norway (q.v.).

In literature, the middle ages produced a few popular poems, histories of saints, rhyming chronicles, and the like. After the Reformation began a period of vigor, fostered by the translation of Scripture (by Olaus Petri and others). Poetry was modelled at first on Italian and German patterns, Stjernhelm, 'father of Swedish poetry,' belonging to this period. In the 18th c., French influence was dominant; the age of Gustaf III. producing the poets Kellgren (d. 1795), Bellmann, Gyllenborg, Oxenstierna, Leopold (d. 1829). The reaction against Gallicism led to the growth of two schools, to the one of which, called Phosphorists, belonged Atterbom (d. 1855), Hammarskjöld, Palmblad (q.v.), and Dahlgren. These were somewhat overstrained romanticists; romantic also, but with more national and local coloring, were the Gothic school, including Geijer (q.v.), Tegner (q.v.), Ling, and Afzelius. Other eminent names are Stagnelius, Sjöberg, Runeberg. Among romance writers are Bremer (q.v.), Carlen (q.v.), Almqvist. Fryxell (q.v.) and Malmström are notable historians. In science, Sweden has Linné (q.v.), prince of botanists, and Fries (q.v.), Berzelius (q.v.), and Scheele (q.v.), chemists.

Education.— Education is universally diffused by the agency of *Fasta* (regular) and *Flyttanda* (ambulatory) schools in all the country districts. There were (1903) 12,267 elementary schools with 17,994 each, and 752,899 pupils; there were 82 public high schools (1904–5), with 20,136 pupils. There were also 14 normal, 8 technical and 10 navigation schools, with 1,424, 3,000 and 347 pupils, respectively. Public instruction is compulsory for all children, and the cost is defrayed by the nation. Ample means are supplied for higher instruction in the Lärovärk or Gymnasia of the towns, and at the universities of Upsala and Lund. The Karolingska Institute at Stockholm is the medical college of S.; and there are numerous technical, military, and other special collegiate institutions in the principal towns of the kingdom. The transactions of the two learned societies, the 'Svenska Vetenskaps Selskap,' and the 'Svenska Akademie,' afford honorable testimony to the advanced condition of scientific inquiry in Sweden. The Royal Library of Stockholm, and those of Upsala and Lund, number about 100,000 vols. each: that of Upsala is in a special building, *Carolina Rediviva*, to which is attached a botanical garden arranged on the Linnæan system.

Railroads, Telegraph, and Post-office.— In 1903 there were 7,631 m. of railroad in operation, of which 2,400 m. belonged to the govt., including a line extending to the Gellivera mines on the Nor. border. The total number of pass. carried (1900) was 30,191,181. There were about 100,000 m. of telephone wire and 81,000 instruments. The

telegraph lines belonging to the state had 5,178 m. of line and private lines had 4,738 m. Ending, 1903–4, 2,782,751 messages. The govt. owned or had an interest also in about 150 m. of cable line. The post-office handled (1903) 356,-130,732 letters, packages, postal-cards and newspapers. The number of post-offices 1904, was 3,138.

History.—The legendary history of S. forms part of Scandinavian history. When we hear first of S., the country was inhabited by numerous tribes, kindred in origin, but politically separate. Two principal groups, however, are recognizable—*Goths* in the s., *Swedes* in the n. These possessed in common a national sanctuary, the temple at Upsala, which laid the basis of a later unification, for gradually the royal chieftains of Upsala extirpated the inferior princes, the Härads and the Fylkis. Ingiald Hrada, last ruler of the old royal family of the Ynglingar, who drew their origin from Njord, sought to establish a single govt. in Sweden, and perished in the attempt. To the Ynglingar followed, in Upland, the dynasty of the *Skioldungar,* which claimed to be descended from Skjold, son of Odin. Erik Edmundsson, who belonged to this dynasty, is said to have acquired the sovereignty of the whole of Sweden about the end of the 9th c. The dawn of Swedish history (properly so called) now begins, and we find the Swedes constantly at war with their neighbors of Norway and Denmark, and busily engaged in piratical enterprises against the e. shores of the Baltic: see NORMANS: RUSSIA. Efforts to introduce Christianity (see ANSGAR) were made as early as 829, but it was not till 1000 that Olof Skötkonung, the Lap-king, was baptized, nor did the struggle between heathenism and the new religion cease till the burning of the temple of Upsala in the reign of Inge (1080–1112). In 1155, Erik, surnamed the Saint, gave a powerful impetus to the spread of Christianity by building churches and founding monasteries. He undertook a crusade against the pagan Finns, and having compelled them to submit to baptism, and established Swedish settlements among them, he laid the foundation of the union of Finland with Sweden. Erik's defeat and murder 1160, by the Danish prince, Magnus Henriksen, who had made an unprovoked attack on the Swedish king, was the beginning of a long series of troubles, and during the following 200 years one short and stormy reign was brought to a violent end by murder or civil war, only to be succeeded by another equally short and disturbed. At length, 1389, the throne was offered by the Swedish nobles to Margaret, Queen of Denmark and Norway, who, having gladly availed herself of the opportunity thus opened to her of uniting the three Scandinavian crowns into one, threw an army into S.; defeated the

Swedish king Albert of Mecklenburg, who, on the deposition of his maternal uncle, Magnus, had been called to the vacant throne; and by the union of Calmar 1397, brought S. under one joint sceptre with Denmark and Norway. In 1523 S. freed itself from the union with Denmark, which, during the reigns of Hans and his son Kristian II. (see DENMARK), had become hateful to the Swedes; and rewarded its deliverer, young Gustaf Vasa (see GUSTAVUS I.), by electing him king, and declaring its independence of Denmark. Gustaf Vasa found an empty treasury, a kingdom exhausted by war, a haughty nobility and clergy (who arrogated the right of electing the sovereign, and who claimed exemption from all imposts), and a people overburdened with taxation and bad government, and divided in religion. On his death, 1560, he left to his successor a hereditary and well-organized kingdom (in which the power of the nobles had been circumscribed, and that of the clergy broken, by the abrogation of Rom. Catholicism, and the firm establishment of the Reformed Church under the jurisdiction of the state), a full exchequer, a standing army, and a well-appointed navy. Trade, manufactures, arts, learning, and science owed their advancement in S. to this patriotic king.

The collossal labors of the great Vasa in raising a semi-barbarous state to an honorable place among the civilized monarchies of Europe, were rendered almost useless by the crimes and misfortunes of his son and successor, Erik XIV., whose high intellectual powers were clouded by a wayward and revengeful nature, ending in insanity. His cruelties and excesses led to his deposition 1568, when his younger brother Johan ascended the throne, which he occupied nearly a quarter of a century, dying 1592, after a stormy reign, stained by the cruel murder of his unfortunate brother Erik, and distracted by the internal dissensions arising from his attempts to force Rom. Catholicism on the people, and to carry on war with the Danes, Poles, and Russians. Johan's son and successor, Sigismund, who had been elected king of Poland through the influence of the relatives of his Polish mother, after a short and stormy reign of eight years, which were spent in attempting to restore Rom. Catholicism in S., was compelled by the diet to resign the throne 1599 to his uncle Karl, the only one of Gustaf Vasa's sons who inherited any share of his legislative and administrative talents. The policy of Karl IX. was to encourage the burgher classes at the expense of the nobility; and by his successful efforts to foster trade—in furtherance of which he laid the foundation of Göteborg and other trading ports—to develop the mineral resources of the country, and to reorganize the system of Swedish jurisprudence, he did much to retrieve the calamitous errors of his predecessors. The deposition of Sigismund gave rise to the Swedo-Polish war of succession 1604–60; and on the death of Karl 1611, his son and successor, the great Gustavus Adolphus, found himself involved in hostilities with Russia, Poland, and Denmark. By the ability of his minister, Oxenstierna, the young king was soon en-

abled to conclude treaties of peace with his northern neighbors, and to place the internal affairs of his kingdom in order (see GUSTAVUS II.); and though he justly ranks as one of the greatest military commanders of his age, the extraordinary number of benefits which he conferred on every department of the administrative system of S., entitle him to still greater renown as the benefactor of his native country. His death 1632, on the field of Lützen, would have proved an irreparable calamity to S. had not the able administration of Oxenstierna, during the minority of Gustavus's daughter Christina, maintained the renown of the Swedish arms abroad, and the political reputation of the country among other states. The reign of Christina (q.v.) was disastrous in every act but that of her abdication. The short reign of Karl X. was occupied in generally unsuccessful wars against Poland and Denmark; while the minority and long rule of his son, Karl XI.—1660–97—was characterized by success abroad, and by the augmentation of the regal power, which was declared by an act of the diet to be absolute. His son Karl, known to us as Charles XII. (q.v.), succeeded, at the age of 15, to the power and dominions which his father's abilities had consolidated, but which, notwithstanding his own brilliant genius, he so deeply imperilled by his insatiable ambition, that at his untimely death 1718, at the siege of Frederikshald, after a brilliant career of glorious but checkered military achievements, he left his country overwhelmed with debts, and disorganized by prolonged misrule. With him the male line of the Vasas expired, and his sister and her husband, Frederick of Hesse-Cassel, were called to the throne by election, but were the mere puppets of the nobles, whose rivalries and party dissensions plunged the country into calamitous wars and almost equally disastrous treaties of peace, and, under the leadership of the two great factions of the 'Hats,' or French party, and the 'Caps,' or Russian party, demoralized all ranks of society. The weak Adolphus Frederick of Holstein-Gottorp, called to the throne on the death of Frederick 1751 (d. 1771), did little to retrieve the evil fortunes of the state; but his son, Gustavus III. (q v.) (1771–92), skilfully turned to account the general dissatisfaction of the people with the nobles, to destroy the factions of the Hats and Caps, and to recover the lost power of the crown. His extravagance, dissoluteness, and insincerity detracted, however, from his merits as a ruler, and raised up numerous enemies against him, through whose agency he was assassinated 1792. His son and successor, Gustavus IV. (q.v.), lacked the ability to cope with the difficulties of the times, and after suffering in turn for his alliance with France, England, and Russia, was forcibly deposed 1809, and obliged to renounce for himself and his direct heirs the crown in favor of his uncle, Charles XIII., who saw himself compelled at once to conclude a humiliating peace with Russia by the cession of nearly a fourth part of the Swedish territories, with 1½ million of inhabitants. The early part of the reign of Charles, who was childless, was troubled by domestic and

foreign intrigues to regulate the choice of an heir to the throne; and when, under the erroneous idea of conciliating Napoleon, the dominant party in S. elected Gen. Bernadotte to the rank of crown prince, the latter assumed the reins of government, and by his steady support of the allies against the French emperor, secured to S. at the congress of Vienna, the possession of Norway, when that country was separated from Denmark. Under the able administration of Bernadotte, who, 1818, succeeded to the throne as Charles XIV., the united kingdoms of S. and Norway made great advances in material prosperity and political and intellectual progress: and though the nation at large had little personal regard for their alien sovereign, his son and successor, Oscar (1844–59), and his grandsons, the late king, Charles XV., and the present king, Oscar II., who came to the throne 1872, have secured for the Bernadotte dynasty the loyal regard of the united nations. Recently, however, discontent has arisen in Norway. A convention at Hamar 1889, June, gave voice to the rising sentiment of the people in resolutions demanding the abolition of the Norwegian vice-royalty: the abolition of the Norwegian delegation in the council of state in Stockholm; the regulation of diplomatic affairs in the manner proposed by Sverdrup 1885; and the abolition of the union symbol in the Norwegian flag. The dissentions on the part of Norway continued until the early part of 1906, when an agreement for the peaceful separation of the two countries was reached. This was not effected, however, without a good deal of bitterness of feeling and even threats of coercion on the part of S. It is claimed that the real cause of the differences between the two countries was due to the fact that Norway, aside from the pronounced democratic sentiment of her people and their fond memories of national independence, is a maratime and agricultural country, devoted to the principal of free trade with all nations; while in S. the manufacturing and aristocratic classes predominate and favor exclusiveness. The real cause of the separation is therefore attributed to the diverse commercial interests of the two peoples.

SWEDENBORG, *swē'dĕn-borg* (or SVEDBERG, *svĕd'bĕrg*), EMANUEL: 1688, Jan. 29—1772, Mar. 29; b. Stockholm; son of Dr. Jesper Svedberg, subsequently Bp. of Skara, a learned and pious man who believed himself to be in intercourse with angels. S.'s lifetime divides itself into two distinct periods: the first, ending with his 55th year, was given to business, science, and philosophy; the second, nearly 30 years, was consecrated to theology and spiritualism. S. was educated at Upsal, and travelled four years in England, Holland, France, and Germany. On his return to Sweden, he was appointed by Charles XII. assessor of mines; and rendered some service to that monarch as milit. engineer. The S. family was ennobled 1719, and the name changed from Svedberg to S., whence S. is sometimes erroneously styled Count and Baron. His mind at this time was busy with mechanical and economical projects. He published short treatises on algebra, giving the first account in Sweden of the differential and integral calculus; on a mode of finding the longitude at sea by the moon; on decimal money and measures; on the motion and position of the earth and planets; on the depth of the sea, and greater force of the tides in the ancient world; on docks, sluices, and salt-works; and on chemistry as atomic geometry. In 1724 he was offered the professorship of mathematics at Upsala, which he declined. Abandoning his desultory studies, he quietly pursued for 11 years his official duties, preparing a systematic description of mining and smelting; but also devoting his singularly original mind to the construction of a theory of the origin of creation. As early as 1721 he had engaged in the search for a scientific theory of the universe. The result appeared at Leipzig 1734, in three massive folios, beautifully illustrated, *Opera Philosophica et Mineralia.* Vols. II. and III. describe the manufacture of copper, iron, and brass, with an exhaustive record of the best methods then in use. Vol. I., *Principia, or the First Principles of Natural Things, being New Attempts toward a Philosophical Explanation of the Elementary World,* is an elaborate deduction of matter from 'points of pure motion produced immediately from the Infinite.' This was followed 1734 by a treatise on *The Infinite, and the Final Cause of Creation; and the Intercourse between the Soul and the Body,* carrying the doctrine of the *Principia* into higher regions, and resolving the soul into points of motion, and one in substance with the sun. Dissatisfied with his conclusions, he determined to track the soul to its inmost recesses in the body: his studies in human anatomy and physiology with this end in view appeared as *Œconomia Regni Animalis,* 2 vols., 1741, and as *Regnum Animale,* 3 vols., unfinished, 1744–5. At this point, when he had risen to the highest rank in the world of science, his course was arrested, and he entered on his career as seer, by which he is known to fame. The particulars of this transition lay in obscurity until 1858, when G. E. Klemming, royal librarian, Stockholm, discovered S.'s diary, kept in 1744. It contains the record of a variety of dreams, visions, and strange communings. After that

date, he believed himself to have free access to heaven and hell. He resigned his assessorship 1747, that he might devote himself to his office of seer. In 1749 he made his first public appearance in his new character in the issue in London of *Arcana Cœlestia,* completed 1756 in 8 quartos. His life thereafter was spent in Stockholm, London, and Amsterdam, in writing and printing many works in exposition of his experience and doctrines. These in their main substance are comprised in the *Arcana Cœlestia.*

Swedenborg made no attempt to establish a sect. When he proclaimed the Christian Church at an end, his expectation was, that a new church would be raised up among the Gentiles; but toward the close of his life he was silent as to that hope, and spent his energies in attacking Protestant theology, as if bent on the conversion of n. Europe. All his works were in Latin: they comprise about 30 octavo volumes. They received little attention from his contemporaries. Largely made accessible through English translations, they have in recent years drawn increasing regard in Britain and in the United States: see SWEDENBORGIANS. Apart from his visions, there was nothing peculiar about Swedenborg, except that he was very simple in his habits (a vegetarian in diet); and that he evinced rare powers of scientific observation, with unusual intellectual gifts—especially in the line of classification, co-ordination, and system building. He was shrewd in worldly affairs, affable in society—winning respect and confidence from all who associated with him; and discussed politics and finance in the Swedish diet like a man of the world. He was never married.

Swedenborg was, beyond question, one of the most remarkable men that ever lived. It is not possible here to discuss his amazing claims, nor the extreme anthropomorphic and allegorizing nature of his system, with its theological exclusiveness unavoidable on his principles. The number of his followers is small, inasmuch as some peculiar intellectual gifts, including a highly spiritualized tendency in thought and feeling, are requisite even fairly to grasp his teaching; but, undeniably, he has widely influenced theological thinking. Many men, eminent in various branches of the church—though failing to see the proof of his claims, or to accept his system as divinely revealed truth—have yet been stirred by him to new, more suggestive, more spiritual views, if not of Christian doctrine, at least of that philosophy which pertains to the nature of man as an inhabitant of the two worlds, visible and invisible.—See Dr. R. L. Tafel's *Documents Concerning the Life and Character of Swedenborg,* 3 vols.; Worcester's *Life of Swedenborg;* James J. G. Wilkinson's *Emanuel Swedenborg, a Biography;* William White's *Swedenborg, His Life and Writings;* Hobart's *Life of Swedenborg.* See also SWEDENBORGIANS.

SWEDENBORGIAN, n. *swē'dĕn-bor'jĭ-ăn:* one who

holds the doctrines of the New Jerusalem Church, as taught by Emanuel Swedenborg (q.v.): ADJ. pertaining to. SWE'DENBOR'GIANISM, n. *-ăn-izm*, the doctrines of.

SWE'DENBOR'GIANS, properly THE NEW JERUSALEM CHURCH: religious body composed of the followers of Emanuel Swedenborg (q.v.), who proclaimed a new dispensation, revealed to him by direct communication with the Lord and with angels. The church called the New Jerusalem derives its name from the Apocalypse or Revelation of John, chapter xxi. 1 *et seq.* The doctrines of this church are set forth in the theological writings of Emanuel Swedenborg, who is recognized by the members of the church as a divinely illumined seer and revelator. The New Jerusalem, of the New Church, as it is denominated throughout Swedenborg's writings, is a spiritual city, not a natural and material city. A spiritual city is the home and abiding place of man's heart and mind, of his love and his faith; therefore such a spiritual city or home is properly called a church. The New Church now being established among men on the earth is what is meant by the descent of the Holy City, the New Jerusalem. But a church is a church from its love and its faith, not from the membership of its organization; hence the New Church must be viewed in the light of its doctrines which present the nature and quality of its love in the form of its faith.

The faith of the New Church is as follows: The Lord Jesus Christ is God himself, the one only God of the universe,—the creator, the redeemer, the regenerator, and the saviour. God in the Old Testament is called most commonly Jehovah (the Lord in A. V.), a Hebrew word signifying *The Being*, 'I am Who I am,' the self-existent and eternal, from whom all things are, thus who is all in all things of his creation. God in the New Testament is called Lord, Jesus Christ, Father, Son, and Holy Spirit, besides other names. Since the Word is God's revelation and expression of himself, the different names by which he is denominated therein distinguish his essence and existence, his love and wisdom and power. They define and qualify his nature and disposition, his ends, his methods and his acts. By the Father, therefore, is not meant a divine being or person separate and apart from other divine persons called the Son and the Holy Spirit, but the Father signifies the divine inmost, the divine esse, the divine love; the Son signifies the divine existere, the divine appearing, divine revelation, divine truth, the divine word, the divine human. The Holy Spirit signifies the divine proceeding, the divine operation, the divine influx, adapting and appropriating to man the divine life of love and truth. Thus the trinity as understood in the New Church is not involved with an idea of three Gods, but it is distinctly taught in the doctrines of this church that there is a trine in God, our Lord Jesus Christ, of love, wisdom,

and power. To this trine he referred when he 'spake in parables' of the Father, Son, and Holy Spirit. It is believed that now is the consummation of the age or the last time of the church—the end of the world, as translated in the authorized version.

The consummation of the age or the last time of the Christian church is predicted in the Evangelists and in Daniel. (See Matt. xxiv. 15, 18, 21, 22, 28: xxviii. 20; Luke xvii. 34; John ix. 4; i. 4 *et seq.;* viii. 12; xii. 35, 36, 46; Daniel ix 27.)

This consummation does not mean a literal and visible destruction of the natural word at the 'last day,' but the end of the former ecclesiasticism as a church in the true sense of the word; that is to say, where genuine charity or love prevails in conjunction with a living faith. That the Christian world to-day is not permeated nor dominated by the principles of human life as taught by Jesus Christ and evangelized by his apostles is one of the evidences and confirmations of the teachings of the New Church, that now is 'the end of the world,' the consummation of the age, the Lord's second coming and the establishment of a new church by him. The last judgment also has been accomplished, primarily and completely, throughout the spiritual world whither all souls depart at death, but in the natural world the effects of the judgment appear gradually, by little and little. in the changes which have come to pass. Among the most conspicuous of such results is the greater freedom of thought and speech in respect to both spiritual and natural things, and hence a more universal breadth of view and tolerance of opinion.

But these signs of the times are only certain effects, visible to common observation, of the second coming of the Lord and his establishment then of the New Jerusalem.

Swedenborg declares, *The True Christian Religion* (No. 772) that this second coming of the Lord is to separate the evil from the good, so that those may be saved who have believed and do believe in him; and to form from them a new angelic heaven and a new church on earth, otherwise no flesh could be saved (Matt. xxiv. 22).

This work of separation was accomplished in the spiritual world in 1757 upon all who had died since the Lord's first coming in the flesh. The separation of the evil from the good, their judgment to hell and the elevation, at the same time, of the good to heaven is what is meant by the Last Judgment, and Swedenborg, having witnessed it, describes the event in a work called *The Last Judgment.*

Since the Lord, when upon earth, glorified his human nature by making it divine and uniting it to the divine from which it was begotten, therefore this second coming must be an appearing and revelation of the Lord God

in his divine-human nature, or, as it is called throughout Swedenborg's writings, the Divine Human.

This Divine Human, invisible to man's natural sight in this world, is manifest clearly in the spiritual world to man's spiritual vision, which everyone enjoys immediately after death. But in order that the second coming might be announced and made known throughout the world as well as among angels and spirits, it was necessary that some man should be chosen and prepared to live consciously in both worlds at the same time in order to see and hear the things transacting in the spiritual world and then to narrate and describe them in natural language for man upon earth.

As such a seer and revelator, Emanuel Swedenborg solemnly asseverates he was especially prepared and appointed to be. In *The True Christian Religion* (No. 771) he says: 'Lest the man of the New Church, like the man of the Old Church, should wander in the shade, in which the sense of the letter of the Word is, especially concerning heaven and hell, and concerning his life after death, and concerning the coming of the Lord, it has pleased the Lord to open the sight of my spirit, and thus to let me into the spiritual world; and not only to give me to speak with spirits and angels and with relations and friends, but with kings and princes, who have departed from the natural world; and also to see the stupendous things of heaven, and the miserable things of hell; and thus that man does not live after death in some unknown place of the earth, nor fly about blind and dumb in the air, or in empty space; but that he lives as man in a substantial body, in a much more perfect state, if he comes among the blessed, than before, when he lived in the material body. Therefore, lest man should become more deeply grounded in the opinion respecting the destruction of the visible heaven and the habitable earth, and thus respecting the spiritual world, from ignorance, which is the source of naturalism, and then, at the same time, atheism, which, at this day, among the learned has begun to take root in the interior rational mind, should, like a mortification in the flesh, spread itself around more widely, even into his external mind, from which he speaks, it has been enjoined upon me by the Lord to promulgate some of the things seen and heard, both respecting heaven and hell, and respecting the last judgment; and also to explain the apocalypse, where the coming of the Lord, and the former heaven, and the new heaven, and the holy Jerusalem, are treated of; from which, when read and understood, any one may see what is meant there by the coming of the Lord, and by the new heaven, and by the new Jerusalem.

'This second coming of the Lord is effected by means of a man, before whom he has manifested himself, and whom he has filled with his spirit, to teach the doctrines of the New Church through the word from him.

'Since the Lord cannot manifest himself in person,

and yet has foretold that he would come and establish a new church, which is the New Jerusalem, it follows that he is to do it by means of a man who is able not only to receive the doctrines of this church with his understanding but also to publish them by the press. That the Lord has manifested himself before me, his servant, and sent me on this office, and that, after this, he opened the sight of my spirit, and thus let me into the spiritual world, and gave me to see the heavens and the hells, and also to speak with angels and spirits, and this now for many years, I testify in truth; and also that, from the first day of that call, I have not received anything that pertains to the doctrines of that church from any angel, but from the Lord alone while I was reading the Word.' (T. C. R. 779.)

Such plain statements as these, and there are very many more like them throughout his writings, to the New Churchman, define Swedenborg's office and place in the world among men and give to all his theological books the stamp and seal of divine authority.

In *Heaven and Hell* (No. 1) Swedenborg declares that his writings are an immediate revelation from God the Lord Jesus Christ, and constitute his second coming. It is, therefore, believed in the New Church that the doctrines revealed through Swedenborg are the divine Word itself, although in quite a different form from the 'Sacred Scriptures,' but the Word is not God's communication of himself to man by virtue of its form, but because of the divine truth which reveals itself in such a manner, the truth really making its own form of manifesting itself.

Throughout his writings Swedenborg shows that the divine word has an internal sense within the literal sense, this internal sense being the very Word itself, its essence, its glory, and its life. This sense, indeed, Swedenborg declared to be disclosed solely by means of his writings. Within the New Church it is believed, therefore, that the writings of Swedenborg are the Lord in his second coming in his divine humanity, and thus the very Word itself in its spiritual sense set forth in a rational and philosophic form.

In America there are two general organizations of those who receive the testimony of Swedenborg and acknowledge his writings to be divine revelation. One, 'The General Convention of the New Jerusalem,' dating from 1817, the other, 'The General Church of the New Jerusalem,' holding its first 'General Assembly' in June, 1897. The representative organ of the former is *The New Church Messenger*. The General Church is represented by *The New Church Life*.

The 'Convention's' theological school is located at Cambridge, Mass. At Bryn Athyn, Pa., is a settlement of New Church families devoted especially to the work of education in accordance with the principles of instruction and the formation of character as set forth in the new revelation. 'The Academy of the New Church,' now

well established there, is a corporation instituted for the purpose of conducting a universal system of schools wherein shall be taught the doctrine and religion of the church, as well as every useful science and art. The end and aim of the academy is to educate its pupils, not only for a life of efficiency in the natural world, but pre-eminently to prepare them to become most useful inhabitants and citizens of the spiritual world in the life after death. The influence of this organization, dating its beginning from 1876, has been incalculable and far-reaching, extending throughout the borders of the church. By its profound study and learning in the doctrines of the church it has set up a standard of interpretation of the writings of Swedenborg, and by its attitude of loyalty and faithfulness has exalted them within the church into a position of supreme authority and power.

Besides these bodies of the church in America and Canada, and the General Conference in Great Britain, there are societies in Europe and Australia, most of them being united to or affiliated with one or other of the general churches in the United States or Great Britain. The Swedenborg Scientific Association was organized May 27, 1898, by members of the New Church.

Consult: Burnham, *Discrete Degrees;* Hindmarsh, *Rise and Progress of the New Jerusalem Church in England, America and Other Parts;* Odhner, *A Brief View of the Heavenly Doctrines, Revealed in the Theological Writings of Emanuel Swedenborg;* Swedenborg, *The True Christian Religion;* Tafel, *Documents Concerning the Life and Character of Emanuel Swedenborg;* Worcester, *The Life and Mission of Swedenborg; The Journal of the Convention of the New Jerusalem in America; The Journal of the General Church of the New Jerusalem.*

SWE'DISH DISSENT'ING CHURCHES: mostly churches that began in groups of persons who so far separated themselves from the national Lutheran Church, 1860-70, as to observe the Lord's Supper privately, and hence were called Lord's Supper or Communion societies. These were merged in mission societies for Christian work, and gradually took the form of church organizations with no common name; the societies were also locally called Brothers' Church, Angasarii Society, and Church of Christ, or Local Church, or God's Church, at such and such a place. From about 1874 the movement became rapid, and 1878 the Swedish Missionary Union was formed, with annual delegates and mass-meetings, quarterly district association meetings, and a ministers' yearly conference. At the same time a confession of faith and rules of church government were adopted. In 1880 a more complete organization was formed under the name Mutual Christian Free Church, but commonly called Free churches. Besides its missionaries employed in Norway, it had 22 foreign missionaries, distributed in Russia, Finland, Lapland, and two in Africa.

SWE'DISH LANGUAGE AND LITERATURE: see SWEDEN: also SCANDINAVIAN LANGUAGE AND LITERATURE.

SWE'DISH MOVE'MENT CURE: see MOVEMENT CURE.

SWEEP, v. *swēp* [Icel. *sópa*, to sweep, to wipe; *sópr*, a besom: W. *ysgub;* Gael. *sguab*, a besom: Bret. *skuba*, to sweep: L. *scopæ*, thin branches, twigs, a besom]: to brush or rub off with a broom or besom; to clean or remove, as by the motion of a broom; to strike or remove with a long stroke; to pass over with swiftness and violence, as the wind or water dashed over a surface; to carry or drive off with quickness and violence; to destroy or carry off, as by a pestilence; to pass with pomp; to draw over, as a net on the bottom of a river: N. the act of brushing off with a broom; the length of reach or swing of a moving body; any part of a ship shaped in a segment of a circle; a rapid survey with the eye; the direction of any motion not in a straight line; range; a chimney-sweep: an oar of great length used in large vessels during a calm, to obtain steerage-way. SWEEP'ING, imp.. ADJ. moving or driving; brushing over, as with a broom; cleaning with a broom; comprehending many persons or things: N. the act of one who or that which sweeps. SWEPT, pt. pp. *swĕpt*. SWEEPER, n. *swēp'ĕr*, one who sweeps. SWEEP'INGLY, ad. *-lĭ*. SWEEP'INGS, n. plu. *-ĭngz*, refuse; rubbish. SWEEPS, n. plu. among *seamen*, large oars used to propel small vessels in a calm. SWEEPY, a. *swēp'ĭ*, passing with a sweeping motion, or with speed; strutting; wavy. SWEEP-NET, a large net for drawing through a large extent of water. SWEEPSTAKES, n. plu. *-stāks*, a wager in which a number of persons take shares according to the number of possible results, the winner receiving all the stakes. SWEEP-WASHER, one who extracts from the sweepings and refuse of workers in gold and silver the lost particles of the precious metals. CHIMNEY-SWEEP, one who cleans chimneys.

SWEET, a. *swēt* [AS. *swete;* Dut. *zoet;* Dan. *söd;* Icel. *sœtr;* L. *suāvĭs*, sweet]: grateful to the taste or smell, pleasing to any of the senses; having the taste of sugar or honey; not sour, as fruit; soft; harmonious; unsalted; pure; mild; gentle; fresh; not stale; not putrescent: N. something pleasing or grateful to the mind; a sweet substance; a word of endearment. SWEETS, n. plu. cane-juice; confections made of or seasoned with sugar; in *England*, home-made wines, etc. SWEET'LY, ad. *-lĭ*. SWEET'NESS, n. *-nĕs*, the quality of being sweet in any of its senses; fragrance; melody; gentleness; softness; mildness. SWEET'ING, n. *-ĭng*, a sweet apple; a term of endearment. SWEET'ISH, a. *-ĭsh*, somewhat sweet or grateful to the taste. SWEET'ISHNESS, n. *-nĕs*, the quality of being sweetish. SWEETEN, v. *swēt'n*, to make sweet; to become sweet; to restore to purity or freshness; to render grateful or pleasing to the mind; to palliate; to make less painful. SWEETENING, imp. *swēt'nĭng:* N. act of making sweet; that which makes sweet. SWEETENED, pp. *swēt'nd:* ADJ. made sweet, mild

or grateful. SWEETENER, n. *swēt'nĕr*, one who or that which sweetens SWEET-SCENTED, or SWEET-SMELLING, a. fragrant. SWEET-TEMPERED, a. gentle and mild in disposition and manners. SWEET-BAY, the victor's laurel whose leaves crowned the conquerors in battle and in the Olympic games; the *Laurus nobĭlĭs*, ord. *Laurūcĕæ*. SWEETBREAD, a long, flat, glandular, fleshy substance lying below the stomach, somewhat resembling a dog's tongue in appearance; the Pancreas (q.v.), esteemed as delicate and nutritious food. SWEET-BRIER or -BRIAR, a thorny shrub of the rose kind, having a sweet fragrant smell; the *Rosa rubiginōsă* (see ROSE). SWEET-FLAG (see ACORUS). SWEET-GUM, see LIQUIDAMBAR. SWEETHEART, a lover. SWEET HERBS, fragrant herbs cultivated for culinary purposes. SWEETMEATS, n. plu. confectionery articles made wholly or largely of sugar; fruit preserved with sugar. SWEET-MILK, milk as it is drawn from the cow, as opposed to skimmed and buttermilk. SWEET-OIL, olive-oil. SWEET-PEA, annual plant of the pea kind, whose flowers are beautiful and sweet-scented (see LATHYRUS). SWEET-POTATO, plant having tubers, much used for food (see BATATAS). SWEET-WILLIAM, flowering plant (see PINK). SWEET-WOOD: see CASCARILLA.—SYN. of 'sweet, a.': sugary; saccharine; dulcet; luscious; fragrant; pleasing; melodious; beautiful; bland; obliging.

SWEET SOP (*Anona squamosa*): fruit of the same genus with the Custard Apple (q.v.); produced by a small bush, with lanceolate leaves, native of warm parts of America, and much cultivated in Brazil, W. Indies, and generally in tropical countries. The fruit is greenish, and resembles an artichoke in size, in form, and in its scaly covering. The pulp is soft, somewhat mealy, sweet, and luscious, with musky aromatic odor and flavor. It is much used both in the E. and W. Indies, generally raw, sometimes cooked. Notwithstanding its foreign origin, it has proved the staff of life to the people of Hindustan in seasons of famine. The seeds are acrid, and the powder of them is used to destroy insect vermin.

SWELL, v. *swĕl* [Icel. *svella*, to swell: Dut. *zwellen*, to boil, to spring: Ger. *schwellen*, to heave]: to increase the size of; to expand or increase: to cause to increase or rise; to grow louder or larger; to dilate; to heave; to bulge out; to be inflated; to rise into arrogance or anger; to grow violent; to augment, as a note in music; to be puffed up: N. increase or enlargement of bulk; increase, as of sound; in *music*, the gradual increase and diminution in the sound of a note; in an *organ* (see below): a gradual elevation of land; a succession of large waves: in *familiar language*, a man of importance; a dressy foppish fellow, who apes a higher position than he actually occupies; a dandy: ADJ. pertaining to a dandy; foppish. SWELL'ING, imp.: ADJ. increasing; tumid; pompous; turgid, as style or language: N. act of enlarging or increasing in bulk; inflation; a tumor; any morbid enlargement; protuberance. SWELLED, pp. *swĕld*: ADJ. enlarged in bulk; also SWOLLEN, pp. *swōl'n*. SWELL'ISH, a. characteristic of a swell; foppish. SWELL-MOB, a

company of well-dressed thieves following their calling, and acting in concert. SWELL-MOBSMAN, a member of the swell-mob. GROUND-SWELL: see under GROUND. ORGAN-SWELL, in an *organ*, a certain number of pipes inclosed in a frame, the gradual opening of which produces increased sound.

SWELL, in an Organ: group of pipes forming a separate department, which may have a separate key-board, and are capable of being increased or diminished in intensity of sound by action of a pedal or lever on a series of shades or shutters overlapping one another like Venetian window-blinds, within which the S. pipes are inclosed. On a well-constructed swell, a practiced performer can imitate not only a gradual *crescendo* and *diminuendo*, but also a *sforzando*, a very small opening sufficing to make an immediate burst on the ear: when the shutters are closed, an imitation of an echo may be produced.

SWELT, v. *swĕlt* [AS. *sweltan*, to die (see SWELTER)]: in *OE.*, to die; to faint; to swoon; to overpower, as with heat. SWEL'TING, imp. SWEL'TED, pp.

SWELTER, v. *swĕl'tĕr* [Goth. *swiltan;* Dan. *sulte*, to die: Icel. *svelta*, to famish (see SULTRY)]: to faint with heat; to suffer oppressive heat; to be ready to faint or perish from excessive heat. SWEL'TERING, imp.: ADJ. oppressed with heat SWEL'TERED, pp. *-tĕrd.* SWEL'TRY, a. *-trĭ*, oppressive by intense heat; sultry.

SWEPT, v. *swĕpt:* pt. pp. of SWEEP, which see.

SWERVE, v. *swĕrv* [expressing the notion of a hum or confused noise: Dut. *zwerven*, to wander, to revel: Sw. *swirra*, to whiz: Dan. *svirre*, to whirl round]: to wander from; to rove; to deviate, as from duty; to turn aside; to bend; to incline. SWERV'ING, imp.: N. act of wandering; deviation from any line, rule, or standard. SWERVED, pp. *swĕrvd.*

SWETCHINE (or SVETCHIN), *svĕch-ēn'*, ANNE SOPHIE (SOIMONOFF): 1782–1857, Sep. 10; b. Moscow. Her father, Soimonoff, was private sec. to Empress Catherine II., and she was brought up at court. She married Gen. S. 1799, and her home became one of the most celebrated salons in St. Petersburg. She embraced Rom. Catholicism 1815; and removing to Paris with her husband, passed the remainder of her life there and in Italy. She was the friend and correspondent of many of the leading French philosophers and authors of her time—e.g., Joseph de Maistre, Alexis de Tocqueville, Lacordaire, Lagrange, De Falloux. The last was her literary executor, and published her *Vie et Œuvres* (2 vols.); *Lettres* (2 vols.); *Lettres inédites.* Her correspondence with Lacordaire and with Lagrange has also been published.

SWIETENIA, n. *swē-tē'nĭ-a* [after Gerard Van *Swieten*, physician to Maria Theresa of Austria]: in *bot.*, the mahogany-tree: see MAHOGANY.

SWIFT, a. *swift* [the idea of rapidity is commonly expressed by the figure of a smart blow: Icel. *svipa*, to whip, to move quickly; *svif*, a sudden movement: Scot. *swipper*, quick, sudden: AS. *swifan* to move quickly]: moving a great distance in a short time; quick; nimble; speedy; ready; of short duration: N. a bird of the swallow tribe, so called from the rapidity of its flight (see below). SWIFT'ER, n. *-ĕr*, among *seamen*, a rope used to confine the bars of the capstan in their sockets; a rope used to defend from external injury the sides of a boat; also, one of two shrouds not confined with the others. SWIFTLY, ad. *-lĭ*. SWIFT'NESS, n. *-nĕs*, rapid motion; quickness; expedition. SWIFT-FOOTED, a. nimble; fleet of foot.—SYN. of 'swift': fleet; rapid; expeditious.

SWIFT: bird of the family *Cypselidæ*, order *Picariæ*, having a close superficial resemblance in form and habits to swallows, which belong to another order, *Passeres*. In common with their order, the swifts differ from swallows in many points of skeleton, vocal apparatus, muscles, tarsal envelope, feet, etc. They are nearly related to the Goatsuckers, e.g., Whip-poor-will and Night-hawk. The typical swifts number more than 20 species of *Cypselus*, all old-world, and only one N. Amer. genus and species, the White-throated S. (*Panyptila saxatilis*) of the s.w. United States, black with white face and breast, and wings and tail with white markings, the species breeding in colonies on cliffs. The sub-family of spine-tailed swifts differs in having the normal number of phalanges. The N. Amer. species are the Black S. (*Nephœcetes niger*, var. *borealis*) of w. regions, nearly uniform blackish; and the Chimney S., miscalled Swallow (*Chætura Pelasgia*), sooty brown, below paler, throat gray, wings black, with the same instinct applied to chimneys that formerly led it to hollow trees, and not implying any intellectual progress, but rather a mistake often fatal to its young in the artificial abode. Another species, Vaux's S. (*C. Vauxii*), of the Pacific coast, is similar, but smaller and paler; length and wing 4½ inches.

Many of the S. group are often popularly called swallows, e.g., that which produces the edible nests of the E. Indies. In the genus *Cypselus*, as now restricted, the tail is generally forked, legs and toes feathered, and very small and weak, all the four toes directed forward. The birds of this genus pass most of their time in the air, and even copulate on the wing. The wings are longer than in any other bird; and the internal structure, even of the skeleton, is peculiarly adapted to prolonged flight. The anatomy resembles that of humming-birds more than that of true swallows.—The Common S. (*C. apus*) is common in almost all parts of n. Europe and of Asia in summer, retiring to tropical or subtropical regions in winter: it occurs even in Lapland. Its residence in its summer quarters is much shorter than that of swallows; and the S. is seldom seen with any of the swallows or martins—the different kinds choosing different localities, even though very close together. The S. is easily recognized in its flight by the

remarkably sickle-shaped wings, and its slight scream is very different from the twitter of the swallow. It is black, with a white throat. It makes its nest in holes of rocks or of walls, often in those of houses. The nest is of bits of straw, dry blades of grass, and bents, feathers, and other such substances, apparently glued together by a mucous secretion. The S. builds sometimes in hollow trees. Swifts, like swallows, seem to return to the same place to make their nest, year after year, and repair the old nest, instead of making a new one.—The Alpine S., or White-bellied S. (*C. alpinus*), is common in s. Europe. It builds in high rocks, sometimes in steeples. It is larger than the Common S., and is the largest of Brit. *Cypselidæ*. Its wings are even longer in proportion than those of the Common Swift. Its voice is sweet—not a scream, like that of the Common Swift.

SWIFT, *swift*, JONATHAN: greatest of English, and perhaps of all, satirists, and the most original writer of his age: 1667, Nov. 30—1745, Oct. 19; b. Dublin, but of Yorkshire parentage. He was a posthumous child, reared in circumstances of poverty and dependence, whose recollection galled his proud irascible spirit, and embittered much of his life. He was supported by relatives, and educated at Kilkenny School and Trinity College, Dublin. As a student he was more intent on personal satires and political rhymes than academical honors; but he remained at college about seven years. He then removed to England, visited his mother in Leicestershire, and by her recommendation was admitted into the house of Sir William Temple, with whose family she had a distant connection. S. seems at first not to have conciliated the regard of the retired minister; but he remained with Temple, studying hard, till 1694, when he went to Ireland, took orders in the Established Church, and obtained a small living, which he resigned in two years, returning to England on summons from Temple, who missed his society and assistance. Temple died 1698, and S. in the following year published his posthumous works, after which he returned to Ireland, obtaining from Lord Berkeley some church preferments, including the vicarage of Laracor, worth in all about £400 per annum, which was all his professional income till he was appointed dean of St. Patrick's, Dublin, in his 46th year. Before this, he had written the wildest and wittiest and most powerful satirical work of the 18th c., *The Tale of a Tub* (1704), daring in invention, rich in humor, and crowded with suggestive thought—the work of a true genius: he wrote also a few essays on ecclesiastical subjects, some inimitable ridicule of astrology under the name of Isaac Bickerstaff, and poetical pieces in a peculiar vein of humor and description. In 1710, S., who was naturally a strong Church of England man and a sturdy opponent both of free-thinking and dissent, found his convictions diverging from the whigs—who also had seemed to neglect rewarding him for his political services; and he went over to the tories. He exerted himself strenuously in behalf of his new allies, Harley and Bolingbroke: he

wrote papers in *The Examiner* (1710); *Letter to the October Club* (1711); *The Conduct of the Allies* (1712); *The Barrier Treaty* (1712); and innumerable pasquinades against the whigs, whom he 'libelled all round.' He had become, by his trenchant, piquant, and satiric pen, a great and formidable power in the state, and was received as the familiar associate of the highest ministers of the crown; yet his own pride, with something of prejudice on the part of others due to his untamable satire as a writer, prevented his gaining higher preferment than the deanery of St. Patrick's. Powerful friends sought for him an appointment to the bishopric of Hereford; but some former victims of his satire used influences that prevented this promotion. His party was overthrown by the death of Queen Anne; and 1714 S. 'commenced Irishman for life,' with strong reluctance and disgust; though after a time he took interest in Irish affairs, and faithfully and conscientiously sought to accommodate himself to Irish feelings and prejudices. As a Prot. ecclesiastic among a Rom. Cath. people, Dean S. gained personal regard and popularity, but few converts. Hatred to Walpole and the English govt. quickened his political activity; and his resistance to Wood's copper coinage—a disgracefully corrupt scheme for supplying Ireland with copper money by an English patentee—raised him to the highest pinnacle of popular favor. His *Drapier Letters* (1724) produced such a ferment in Ireland that the govt. was compelled to abandon the scheme of the coinage. Two rewards of £300 each had been offered for the unmasking of the Drapier; but not a traitor, as he says, could be found in all Ireland to sell him. The triumphant author made his last visit to England 1726, and published his *Gulliver's Travels*, by far the most famous and universally popular of all his works. It is, in fact, the keenest of satires on statesmen and court life; but its bubbling fun, its strictly logical absurdity, its audacious paradoxes, and its undertone of truth to human nature, give mirthful delight to readers who do not recognize the objects of its satire. The last of its four parts, however, is overdrawn, and its unnatural strain is more vexatious than amusing. He next joined with Pope, Arbuthnot, and Gay in publishing three volumes of *Miscellanies*, after which he returned to Ireland (1727, Oct.), and never left it again. He was subject to fits of giddiness and deafness, which increased in frequency and intensity as he grew old; he brooded over the anticipated insanity which he foreboded as his future lot; his temper, always irritable and egotistic, became more violent and morose under cerebral disease, and his memory and other faculties gave way. There was also a deep and secret grief: the fate of two ladies, Esther Johnson and Esther Vanhomrigh (known as Stella and Vanessa), had been for years inseparably entwined with his own destiny; both had sacrificed for him all but honor, and both had sunk under disappointed hopes and blighted affection: Vanessa had died 1723, Stella 1728. We cannot here trace the painful story, which is involved in mystery; but for a time the retribution of S. was terrible. He seems

to have been incapable of the passion of love, though not without a certain solicitousness of tender affection; and though documentary evidence is lacking, there seems to be proof of his marriage to Stella 1716. On various trifling pretexts, he refused to acknowledge the marriage publicly. Yet, as is remarked by Thackeray, he everywhere half-consciously recognizes Stella as his better angel, and her declining health gave him the sincerest grief.—Some of his minor pieces were written in his later years—among them, *The Grand Question Debated; On Poetry, a Rhapsody; The Legion Club; Verses on the Death of Dr. Swift;* and that extraordinary prose tract *The Modest Proposal,* a master piece of irony, in which he proposes to relieve the distresses of the poor Irish by converting their children into food for the rich. The last three years of S.'s life were passed in almost total silence in the hands of keepers.

Among English authors, Shakespeare alone has received a greater amount of criticism and annotation. From Johnson to Thackeray, the most brilliant critics and biographers have employed themselves in elucidating his strange and sad history, and in estimating his writings. He is a tragic figure in literature: it is the saying of Thackeray, 'To think of him is like thinking of the ruin of a great empire.' As a consummate master of ridicule and irony, possessing great powers of wit, invention, illustration, and analogy; possessing also the dramatic faculty that enabled him to aasume and portray varieties of character; and as writing a pure, perspicuous English style, unsurpassed for strength and simplicity, Dean S. must ever be a model in our language and literature. His misanthropy, or degradation of human nature—his Yahoos (as in the last part of *Gulliver's Travels*), Strulbrugs, daring irreverence, and indelicacy—are utterly indefensible. He had a total incapacity, as De Quincey remarks, for 'dealing with the grandeurs of the human spirit, with religion, with poetry, or even with science, when it rose above the mercenary practical.' His literary concern was with the world—with the follies, vices, and absurdities of men.—His poetry was not equal to his prose; it lacks passion, elevated feeling, and imagination. His complete works were edited by Sir W. Scott (19 vols. 1814). See Life by John Forster (I. 1875, unfinished); by Leslie Stephen (1882); and by H. Craik (1883): the last ranks as the standard work on the subject.

SWIFT, *swift*, JOSEPH GARDNER, LL.D.: 1783, Dec. 31 —1865, July 23; b. Nantucket, Mass.: civil engineer. He was the first graduate at the U. S. Milit. Acad., 1802; entered the army as 2d lieut. of engineers the same year; was promoted capt. 1806, maj. 1808, and lieut.col., col., and chief engineer 1812; planned the defenses of New York Harbor 1812–3, and was chief engineer of the army on the St. Lawrence river 1813; brevetted brig.gen. 1814; supt. U. S. Milit. Acad. 1816–7; U. S. surveyor of the port of New York 1818–27; and supt. of harbor improvements on the lakes 1829–45. In 1841 he was a peace commissioner to the Canadian provinces.

SWIFT, LEWIS, PH.D.: astronomer: b. Clarkson, N.Y., 1820, Feb. 29, where he received his only schooling. Educating himself in the sciences, he was an itinerant lecturer on magnetism, electricity, and microscopy. Removing to Rochester, N. Y., 1872, he made original observations with a telescope constructed by himself, and received the gold medal of the Vienna Acad. of Sciences for discovery of comets. Hulbert H. Warner built for him the Warner Observatory and residence, citizens contributing to the new telescope. For this, Prof. Swift invented important mechanical improvements, and previously invented an oxy-hydrogen microscope, etc. For his work on the comet of 1880, he was awarded a prize by the French Acad. He has discovered many nebulæ, and the 8-tailed comet of '92.

SWIFT, WILLIAM HENRY: engineer: 1800, Nov. 6—1879, Apr. 7; b. Taunton, Mass.; brother of Joseph Gardner S. He graduated at the U. S. Milit. Acad. 1819; served with Long's Rocky Mountain expedition till 1821; was on topographical duty in making various surveys 1821–32; was brevetted capt. and appointed asst. topographical engineer 1832; and was promoted full capt. 1838. In 1843–49 he was asst. to the chief of topographical engineers; 1847–49 designed and built the first Minot's Ledge light-house; 1849 resigned from the army; and afterward was pres. of various railroads.

SWIG, v. *swĭg* [Dut. *zwelgen*, to devour, consume (see SWALLOW): comp. also *swill*]: to drink a large draught in sounding gulps; to suck greedily: N. a large draught. SWIG'GING, imp. SWIGGED, pp. *swĭgd.*

SWILL, v. *swĭl* [AS. *swilian*, to wash. Icel. *skyla;* Dan. *skylle*, to rinse, to wash]: to rinse; to wash out with water, to drink greedily; in *OE.*, to drench; to be intoxicated: N. the mixture of liquid substances given to swine, also called SWILL'INGS, *-lĭngz;* drink taken in excessive quantities. SWILL'ING, imp.: ADJ. drinking grossly; in *OE.*, intoxicating; drenching. SWILLED, pp. *swĭld.* SWILL'ER, n. *-ĕr*, one who swills or drinks heavily.

SWILLY, LOUGH, *lŏch swĭl'ĭ:* inlet of the Atlantic, on the n. coast of Ireland, county of Donegal, entering between Dunaff Head on the e. and Fanad Point, on which there is a light-house, on the w. It penetrates the country in an irregular but generally s. direction, is about 25 m. long, and at its entrance, where it is widest, 3¾ m. wide. On the e. shore is the small town Buncrana, a resort for sea-bathing, in front of which is a roadstead capable of accommodating the largest men-of-war.

SWIM, v. *swĭm* [originally applied to the movement of water in agitation: Icel. *svamla*, to splash, to paddle in water; *svimma*, to swim: Ger. *schwemmen*, to bathe in water, to float; *schwimmen*, to swim: Sw. *svimma*, to be dizzy]: to move about on the surface of water by movements of the hands and legs; to move through water by means of fins, as fish; to be carried along on the surface of water; to float on water: to cause to swim; not to sink; to pass over by swimming, as a river; to have a waving

feeling in the head, when the visible scene appears in unsteady movement like the surface of water; to be dizzy: N. a movement on the surface of water; the air-bladder of a fish which supports it in water. SWIM'MING, imp.: ADJ. floating on a fluid; moving in or on water: N. the act or art of propelling the body through water by movements of the hands and feet (see SWIMMING AND DIVING); a floating: dizziness. SWAM, or SWUM, pt *swăm* or *swŭm*, did swim. SWUM, pp. *swŭm*. SWIM'MINGLY, ad. *-lĭ*, in *familiar language*, smoothly; without obstruction; with great success. SWIM'MER, n. *-mĕr*, one who or that which swims; a protuberance on a horse's leg; a water-fowl. SWIM'MERETS, n. *-ĕts*, limbs of crustacea adapted for swimming. TO SWIM WITH THE STREAM, to go with popular opinion.

SWIMMING AND DIVING: arts of propelling the body in water and of plunging head-foremost into water. The first lesson for the mind of the beginner is that the living human body is specifically lighter than water, and therefore does not necessarily sink therein The easiest way of convincing the pupil of the buoyancy of the body is by having him lie on the back (slightly hollowed), with arms stretched out beyond the head, but not lifted out of water: this attitude makes respiration easy and counterbalances the weight of the legs. The knees may be bent outward and the hips should be rigid, thus helping to keep the legs as close as possible to the surface. As in learning to float, so in learning the use of the arms and legs in swimming, perfect self-possession is indispensable. All hurry and excitement must be avoided, and every complete stroke and kick performed with precision. The only part requiring strong muscular exertion is the closing of the legs after they have been spread apart: every effort is to be made to insure correctness and power in this act. The arm movements should be easy and graceful, jerkiness being avoided.

The movement known as *treading* is of great importance: if persons unable to swim when accidentally immersed, would practice treading, they could in very many instances sustain themselves in the water for a considerable time, or until the arrival of help. In treading, the hands and arms are to be kept under the surface, while the body stands perpendicular. The hands are to make a motion precisely like that made by a dog's paws, but never above water, never splashing; at the same time the feet strike down, always slowly, gracefully; the head to lean backward, keeping mouth and nostrils out of water.

The most famous performances in swimming in recent times are the following:

Distance.	Swimmer.	Time, h. m. s.
80 miles	Capt. Webb	....
40 "	Capt. Webb	9 57 0
20 "	F. Cavill	5 51 0
20 "	Agnes Beckwith	6 25 0
3 "	J. Finney	1 26 30
2 "	T. E. Kitchling	54 57¾
1 "	A. Meffert	12 0½
1,000 yds.	J. Nuttall	14 17¼
880 "	E. Dunsman	3 1½

In Diving, the performer, before making his leap, holds feet and legs together, with chest inflated; body and legs bent toward the water. The lungs are charged, and the dive is made immediately before the arms and hands are raised forward into the air above the bent head. The feet are used with all the power possible in springing off. When in mid-air the diver straightens himself out from finger-tips to toes. The shoot downward is made by declining the arms so as to inclose the head, the chest is momentarily contracted, and the water is entered, fingers first. A skilled diver does not descend more than 3—4 ft., but a clumsy performer will descend 7–8 feet.

SWINBURNE, *swĭn'bĕrn*, Algernon Charles: English poet: b. London, 1837, April, 5; d. there 1909, April 10; son of Admiral Charles Henry S., by Lady Jane Henrietta, daughter of the third Earl of Ashburnham. He entered as a commoner at Balliol College, Oxford, 1857, but left the univ. without graduating. His first literary venture (1861), a volume containing two plays *The Queen Mother* and *Rosamund*, attracted little attention: but *Atalanta in Calydon*, tragedy (1865), at once established his reputation. Afterward came *Chastelard*, tragedy (1865); *Poems and Ballads* (1866); *A Song of Italy* (1867); *Siena* (1868); *Songs before Sunrise* (1871): *Bothwell*, tragedy (1874); *Erechtheus* (1875); and a new series of *Poems and Ballads* (1878). S. belonged to what has been aptly called the 'fleshly school' of poetry, and even those who most admire his power of poetical expression, marvellous felicity in musical versification, richness of coloring, and happy lyrical effects, deplore the sensuous tone of his muse. His other publications include: *Essays and Studies* (1875); *Note on Charlotte Brontë* (1877): *A Study of Shakespeare* (1879): *Songs of the Springtides* (1880): *Studies in Song* (1881): *Mary Stuart, a Tragedy* (1881), which, in connection with *Chastelard* and *Bothwell*, completes a dramatic trilogy; *Tristram of Lyonesse, and Other Poems* (1882): *A Century of Roundels* (1883): *Marino Faliero: a Tragedy* (1885); *Prose Miscellanies*, and *The Life of Victor Hugo* (1886): *The Armada* (1888): *A Study of Ben Johnson*, and *An Autumn Vision* (1890); *The Sisters* (1892); *Astrophel* (1894); *Tale of Balem* (1896); *Rosamond* (1897); *Queen of the Lombards* (1899).

SWINDLE, v. *swĭn'dl* [Ger. *schwindel*, swimming in the head — applied to dealings in which the parties seem to have lost their head; *schwindler*, a cheat, a swindler. Dan. *svimle*, to be dizzy (see Swim)]: to cheat grossly under the pretense of fair dealing; to defraud with deliberate artifice: N. a fraud or imposition; a design to cheat people out of money. Swin'dling, *imp. -dlĭng:* Adj. cheating: defrauding: N. act of grossly cheating; knavery. Swindled, pp. *swĭn'dld*, grossly cheated. Swin'dler, n. *-dlĕr*, a cheat; one who makes it a practice to cheat others; a sharper; a rogue.

SWINDON, *swĭn'don:* old market-town of Wilts, England; about 77 m. w. of London, on an eminence commanding fine views. There is a large corn-exchange. A mile n. of the town is Swindon Junction, the great central establishment of the Great Western railway; and a large town has risen around the station, called the New Town, consisting mainly of dwellings for the employés of the railway. S. has a large and beautiful church, a public park, library, and mechanics' institution. Pop. of S., Old Town (1891) 5,545; New Town, 27,295.

SWINE, n. sing. or plu. *swīn* [Goth. *svein;* Pol. *swinia,* swine: Ger. *schwein;* AS. *swīn;* L. *sus,* a sow]: a pig; a sow; pigs collectively (see HOG). SWINISH, a. *swī'nĭsh,* resembling a sow; gross; hoggish. SWI'NISHLY, ad. *-lĭ.* SWI'NISHNESS, n. *-nĕs,* the state or quality of being swinish. SWINEHERD, a keeper of swine. SWINESTONE, the fetid varieties of limestone, better known as *stinkstone.* SWINE-STY, a pen or house for swine.

SWINEMÜNDE, *swē'nĕh-mün'deh:* maritime and fortified town of Prussia, province of Pommern; 35 m. n.w. of Stettin, on the island of Usedom, at the entrance of the narrow channel of Swine, which connects the Grosses Haff (into which the Oder flows) with the Baltic. S., as in some sense the port of Stettin (q.v.), has considerable commerce, also valuable fisheries; but it is noted chiefly for its excellent sea-bathing. The light-house of S. has a tower 200 ft. high.—Pop. (1880) 8,478; (1890) 8,508.

SWINE-PLAGUE: infectious disease attacking swine. It was long supposed to be identical with the anthrax diseases which are known under the general name of hog-cholera and which, in some respects, it closely resembles; but investigations in recent years, under direction of the U. S. dept. of agriculture, have shown it a distinct malady. The bacteria which cause the S.-P. are quite different from and less vigorous than those which cause hog-cholera. The S.-P. affects primarily the lungs and secondarily the intestines, but the hog-cholera manifests itself first in the digestive organs and afterward involves the lungs. Attacks of S.-P. vary greatly in severity. In some outbreaks the disease is very malignant, spreads rapidly, and causes enormous losses; in others it appears in milder form. The bacteria of S.-P. and of hog-cholera are sometimes present in the same animal, causing a complication of diseases. In such cases the distinctive form of the attack depends on the relative vigor of the two classes of bacteria. Among the prominent symptoms of S.-P. are coughing, loss of appetite, and rapid emaciation. The disease appears over large areas and under widely different climatic conditions. In this country it is by far the most prevalent in the great hog-growing states of the west. It is spread by contact and by the infection of the soil and pens where diseased animals have been kept. Treatment is usually of little avail; and as the few animals which survive an attack seldom thrive, and as for some time they are liable to communicate the disease to healthy stock, it appears best, on the

appearance of the disease, to destroy the entire herd immediately. The carcasses of such animals should be burned or deeply buried; the feeding-troughs, yards, and pens thoroughly disinfected by the use of carbolic acid or some equally powerful substance; and for several months after an outbreak no swine should be allowed on an infected field. If an effort is made to save any of the stock from a herd in which the disease has appeared, the healthy animals should be promptly taken to new quarters, kept on a light diet, and given the best of care. But preventive measures are far more satisfactory in results than efforts for cure. They consist in careful breeding with a view to securing strong constitutions, preventing contact with diseased animals and with all other sources of infection, supplying good food of various kinds, providing plenty of room and clean surroundings, and giving attention to all hygienic conditions. Many experiments have been made to test the value of inoculation as a preventive of the S.-P., but thus far the results seem uncertain, and the method is open to the grave objection of carrying the germs of the disease to new localities.

SWING, v. *swĭng* [Ger. *schwingen;* Dan. *svinge,* to whirl, to brandish: AS. *swingan,* to scourge, to beat]: to cause to wave or vibrate; to wave loosely; to vibrate; to oscillate; to whirl round; to move to and fro, as the arms in walking; to brandish; to flourish; to change position at anchor, as a ship at each turn of the tide; *colloquially,* to be hanged: N. motion from one side to the other; a waving motion; an apparatus to swing in or from; unrestrained liberty or license; the sweep of a moving body; bent; the influence or power of a body put in motion. SWING'ING, imp.: ADJ. moving to and fro; waving; brandishing; great; huge: N. act of moving to and fro. SWANG, or SWUNG, pt. *swăng* or *swŭng,* did swing. SWUNG, pp. *swŭng.* SWING'ER, n. *-ĕr,* one who swings. SWING'INGLY, ad. *-ĭng-lĭ,* in a swinging manner; vastly; greatly. SWING-BRIDGE, a bridge that may be moved by swinging, to admit the passage of vessels. SWING-PLOW, a plow without a forewheel under the beam. SWING-TREE, the bar of a carriage to which the traces are fastened; also SWINGLE-TREE. SWING-TREES, three cross-bars of a plow, consisting of the long or master tree hooked to the bridle of the plow, and the two short trees in front, each hooked to an end of the master tree. SWING-WHEEL, in a *timepiece,* the wheel which drives the pendulum. SWING-SWANG, *familiarly,* an alternate movement, one up and one down. In FULL SWING, at its height, as an entertainment; enjoying free course.

SWING, *swĭng:* cognomen assumed by senders of threatening letters during the period in England when the irritation of the agricultural laborers against their employers was at its height, 1830–33. The laborers believed that the use of machinery would lessen the demand for labor, and reduce wages; and their irritation was intensified by cruel severity in enforcing the game-laws. As inattention of employers to the demands in these threaten-

ing letters was followed by the burning of their stacks, farm-buildings, etc., the dictates of 'Captain Swing' were in many places obeyed; and the abuse became intolerable. Then the law was applied; and the punishment of the offenders ended the outrage.

SWING, *swĭng*, DAVID, D.D.: undenominational pastor: b. Cincinnati, O., 1830, Aug. 23. He graduated at Miami Univ., O., 1852, and was prof. there 12 years, preaching on occasion. The Fourth Presb. Church of Chicago, of which he became minister 1866, was burned in the great conflagration 1871, after which his congregation had services in hall or theatre until a new church edifice was built 1874. In that year he was tried for heresy, on charges made by Prof. Francis L. Patton, but was exonerated. Since then, he and his large congregation have preferred freedom from denominational associations, and have worshipped in the large Central Music Hall. Several volumes of his discourses have been published, entitled *Truths of To-day* and *Motives of Life;* he was also a contributor (1890) to *The Beginning and the End*, or comments on the life of Christ by various authors. As a preacher he attached to himself a great congregation: he was broad, practical, literary, with a prevading spirit of geniality; but his published discourses do not sustain fully the reputation acquired by his living voice. D. 1894, Oct. 3, in Chicago

SWINGE, v. *swĭnj* [see SWING: AS. *swingan*, to do something with violent action: Ger. *schwinge*, a swingle. Dut. *zwingelen*, to swingle flax]: to beat soundly; to whip; in *OE.*, to move, as a lash: N. in *OE.*, sweep or swing of anything in motion. SWINGEING, imp. *swĭn'jing*. SWINGED, pp. *swĭnjd*. SWINGED-BUCKLERS, in *OE.*, same as SWASHBUCKLERS, which see under SWASH. SWINGEL, n. *swĭng'gl*, that part of a flail which falls on the grain in thrashing. SWINGLE, v. *swĭng'gl*, to beat; to clean or dress by beating, as flax; to swing or dangle: N. in *wire works*, a wooden spoke fixed to the barrel that draws the wire: a crank; also, same as SWINGEL. SWIN'GLING, imp. *-glĭng* SWINGLED, pp. *swĭng'gld*. SWINGLE-TREE, the cross-bar of a carriage, plow, etc., to which the traces of a harnessed horse are fastened; a whiffle-tree. SWINGLE-TOW, the coarse part of flax separated from the finer.

SWINISH, SWINISHNESS: see under SWINE.

SWINK, v. *swĭngk* [AS. *swincan*, to toil, to labor: Ger. *schwanken*, to vibrate, to shake: Low Ger. *swunken*, to sway to and fro]: in *OE.*, to toil; to drudge; to labor: N. in *OE.*, labor; toil; drudgery. SWINK'ING, imp. SWINKED, or SWINKT, pp. *swĭngkt:* ADJ. in *OE.*, tired with work: overworked. SWINK'ER, n. *-ĕr*, in *OE.*, a laborer.

SWINTON, *swĭn'ton*, JOHN: journalist: b. Salton, Scotland, 1830, Dec. 12. Having come to America 1843, he learned the printer's trade, and was for a few years journeyman printer. Then he received a literary education in Williston Seminary, Easthampton, Mass. He was an active partizan of the free-state cause in Kansas 1856; began the study of medicine in New York 1857, at the same time

contributing articles to the N. Y. *Times*, of which he was later managing editor; afterward he was for some years managing editor of the N. Y. *Sun*. He published and edited a weekly newspaper 1883–87 in the interest of social reform. He died 1901, Dec. 15.

SWIN'TON, WILLIAM: author: b. Salton, Scotland, 1833, Apr. 23; bro. of John S. He came to this country; was educated at Amherst Coll.; was prof. of languages in a girls' seminary at Greensborough, N. C., 1853–4; then was prof. in Mt. Washington Collegiate Institute, New York. He joined the editorial staff of the N. Y. *Times* 1858; and 1862 went as correspondent to the seat of war. Gen. Burnside ordered his exclusion from the army lines 1864, because of his criticisms of certain tactical movements; S. incurred the displeasure of Gen. Grant for like reasons. He was prof. of belles-lettres in the Univ. of Cal. 1869–74. By his private studies, his observations in the field, and his later researches, he fitted himself to be a historian of the secession war, and wrote several volumes on different military operations. He is author of a series of school text-books covering nearly all the branches studied in common schools. To S. was awarded at the Paris World's Fair of 1867 a gold medal 'for educational works of remarkable originality and value.' Died 1892, Oct. 25.

SWIPE, n. *swīp* [another form of *swape:* Icel. *svipa*, to move rapidly to and fro]: a contrivance for drawing water, consisting of a rod unevenly balanced on a post, having a weight at the short end and a bucket at the long end.

SWIPE, v. *swīp* [Norw. *skvip*, thin and tasteless drink: Ger. *schwappen*, to splash: prov. Dan. *svip*, thin beer]: in *prov. Eng.*, to drink off hastily. SWIPES, n. *swīps*, a kind of weak or small beer.

SWIPE, v. *swīp* [see SWEEP]: to deliver a strong blow: N. a sweeping blow.

SWIRL, v. *swėrl* [Norw. *svirla;* Dan. *svirre*, to whirl]: to rush along in eddies; to form eddies.

SWISH, v. *swĭsh* [see SWITCH]: to lash; to switch.

SWISS, n. *swĭs:* a native of *Switzerland;* the language. SWITZER, n. *swĭt'sėr*, a native of Switzerland.

SWISS GUARDS: Swiss soldiers formerly hired by many European sovereigns for personal body-guards and for special services about courts. They were common in France 1616 to 1830, and were distinguished for bravery and devotion to the interests of those whom they served. The usage of Swiss citizens hiring themselves out for foreign military service has been entirely discontinued, except that the pope still maintains such a body at the Vatican, whose duties are more ceremonial than protective.

SWISSHELM, *swĭss'hĕlm*, JANE GREY (CANNON): political agitator: 1815, Sep. 6—1884, July 22; b. near Pittsburgh, Penn. She earned livelihood from the age of 8 till 21 by manual labor and teaching. Marrying James S. 1836, she settled in Louisville, Ky., and was soon known as a resolute opponent of slavery. Her first appearance in print

in this character was in the Louisville *Journal*, 1842. She was a regular contributor to the Pittsburgh *Spirit of Liberty*, an organ of abolition and woman's rights. She founded a similar journal, the Pittsburgh *Saturday Visitor*, 1848, which was merged in the weekly edition of the Pittsburgh *Journal*, 1856. The next year she established at St. Cloud, Minn., another *Visitor*. A mob sacked her office and threw her press into the river. Then she started the St. Cloud *Democrat*, and in the presidential canvass of 1860 championed the republican party effectively with voice and pen. Besides her contributions to newspapers and magazines, Mrs. Swisshelm was author of *Letters to Country Girls* (1853), and an autobiographical work, *Half of a Century* (1881).

SWITCH, n. *swĭch* [imitative of the noise made by it in moving rapidly through the air: O. Dut. *swick*, a scourge or whip: prov. Ger. *swutsche*, a long thin rod: Icel. *svigi*, *sveigr*, a switch]: a thin flexible branch of a tree; a twig; on the *permanent way of a railway*, a movable part of a rail for the purpose of transferring a carriage from one line or track to another; a device in telegraphy by which one circuit can be connected with another: V. to strike with a flexible rod or twig. SWITCH'ING, imp.: N. a beating with a switch. SWITCHED, pp. *swĭcht*.

SWITCHBACK: an inclined railway in which the progress of the train or car is effected partly or wholly by gravity, the car first running down a steep incline, and by its momentum surmounting a lesser incline, alternate ascents and descents continuing to the end of the course. Switchback railways are constructed also by curving a track alternately backward and forward along the side of a hill, thus obtaining practicable grades for ascent and descent.

SWITCHBOARD: any surface on which the switches, rheostats, and measuring instruments which control a dynamo-electric machine or a number of them are placed. Usually it comprises a series of marble or slate panels, fixed vertically on an iron framework and on the surface of the panels, the instruments and other devices are mounted.

SWITH'IN, or SWITH'UN, Saint: bishop of Winchester (852-862). He was tutor to King Egbert's son Ethelwulf, a zealous builder of churches, and of conspicuous devotion. He is credited with many miracles, and when he died asked to be buried where 'passers-by might tread on his grave and where the rain from the eaves might fall upon it.' When a century later his body was to be exhumed for the purpose of being deposited in the cathedral, on the day appointed for the translation (July 15) it rained, and for many days after, so as to delay the ceremony. Hence, it was believed, originated the idea that if it rain on St. Swithin's day it will be wet weather 40 days after it.

SWITZER: see under Swiss.

SWITZERLAND, *swit'zer-land* (Ger. *Schweiz;* Fr. *Suisse;* It. *Svizzera*): inland country of Europe, between 45° 48′—47° 49′ n. lat., and 5° 55′—10° 30′ e. long,; greatest length e. to w. 180 m., greatest width 130 m.; 15,964 sq. m. Of this area, about 710 sq. m. are occupied by glaciers, and about 520 sq. m. by lakes.

Population.—Pop. (1870) 2,669,147; (1880) 2,846,102; (1900) 3,315,443. The following table gives the area and pop. of cantons by census 1888 and 1900:

Cantons.	Sq. Miles.	Pop. 1888.	Pop. 1900.
Zürich	665	339,014	431,036
Bern	2,657	539,271	589,433
Lucerne	579	135,780	146,159
Uri	415	17,284	19,700
Schwyz	351	50,396	55,385
Unterwalden (Upper)	183	15,032	15,260
" (Lower)	112	12,524	13,070
Glarus	267	33,800	32,349
Zug	92	23,120	25,093
Freiburg	644	119,562	127,951
Soleure	302	85,720	100,762
Basel (Town)	14	74,251	112,227
" (District	163	62,123	68,497
Schaffhausen	114	37,879	41,514
Appenzell (Exterior)	101	54,200	55,281
" (Interior)	61	12,906	13,499
St. Gall	779	229,441	250,285
Grisons	2,773	96,291	104,520
Aargau	542	193,828	206,498
Thurgau	381	105,091	113,221
Tessin, or Ticino	1,088	127,274	138,638
Vaud	1,244	251,288	281,379
Valais	2,027	101,925	114,438
Neufchatel	312	109,047	126,279
Geneva	108	107,000	132,609
Total	15,976	2,934,057	3,315,443

Surface.—S. is the most mountainous country of Europe. Its principal chains are the Alps (q.v.) and the Jura (q.v.). The Alps run from e. to w. along its s. or Italian frontier. Their ramifications fill more than one-half of the country, and terminate along a line which may be traced from Vevey, on the Lake of Geneva, to Mt. Moleson and Mt. Napf, across Lake Zug, to the s. shores of the lakes of Zürich and Wallenstadt, and Sargans on the Rhine. The mean elevation of the highest chain is 8 000 to 9,000 ft. The Jura run n.e. from the w. corner of S.. they consist of a series of parallel ridges inclosing long and narrow valleys, and their mean elevation does not exceed 4,000 ft. In the angle formed between them and the Alps lies the plain of S., a tableland 100 m. long and 20 to 30 m. wide, with mean elevation about 1,400 ft. above the sea. It is not absolutely level, but covered with elevations, which seem unimportant when contrasted with the huge masses of the Alps and Jura. It has been aptly described as a corner of s. Germany, penetrating like a wedge between France and Italy. The communication between the plain of S. and the German valleys of the Danube and

Rhine is not, however, continuous. The plain on the e. terminates in a third hilly tract—the Thur hill-country, between the lakes of Zürich and Constance, and to some extent at least, forming a barrier between the plain of S. and Germany. Jura, the plain, and the hill-country are thus the great divisions of n. Switzerland. The divisions of the Alpine region are more strongly marked in nature. A glance at the map will show that the chains which overspread it radiate from a mountain knot w. of the Grimsel Pass. They isolate and inclose (1) the valleys drained by the Rhone, which connect S. with s. France; (2) Ticino, drained by streams which descend to the Po, and have at all times brought this country into close communication with Italy; (3) The Grisons, the most sequestered valleys of S., drained by the tributaries of the Rhine and Danube, and shut out by mountains from the lower basins of these rivers; (4) The Bernese Oberland, which slopes toward the w. extremity of the Swiss plain; (5) The district of the Forest Cantons—Schwyz, Uri, and Unterwalden—surrounding the Lake of Lucerne, and which slope toward the e. extremity of the plain, and seem a great mountain fortress erected in the very heart of S., to protect the plain from German invasion.

Geology is of little importance in explaining the general geography of S. In the s. Alpine region, the rocks are crystalline; in the n. Alpine region, they belong to the Jurassic and Upper Secondary strata; in the plain and a great part of the hill-country, they consist of loose Tertiary sands and clays, which supply the best agricultural soils of S. Those rocks and formations in which mines and coal chiefly abound are absent.

Climate.—The climate varies chiefly with elevation above sea-level. Above 9,500 ft., the mountains are covered with perpetual snow, which descends along the hollows in Glaciers (q.v.) to a much lower level, and in this way covers the elevated part of the country with a vast sea of ice. Below the level of perpetual snow, the surface of S. has been divided into a series of belts, characterized by different climates and productions. The highest belt, between the snow and the level of 6,900 ft., has been called the Upper Alpine region: in it, the glaciers fill the valleys, but plants clothe the scanty soil of the ridges. The second or Lower Alpine belt descends to 4,800 ft.: it is a country of pastures, in which shrubs but no trees make their appearance. The Righi Pass, the Grimsel Hospice, and the Splügen are included in it. The third belt descends to 4,350 ft.: the meadows still abound in it, but forests of firs and maples in many parts replace them. It includes Urfenthal and Oberengadin The fourth belt sinks to 3,000 ft.: the forests still abound, the beech being the prevailing tree the meadows are excellent, and rye and barley are successfully cultivated. It includes Weissenstein, Grindelwald, and Engelsberg. The fifth belt lies above 1,800 ft.: in it the oak and walnut are the characteristic forest trees: spelt and the best wheat are cultivated. It includes Bern, Coire, and St Gall. The last belt sinks to 750 ft.: in it

the chestnut is the characteristic tree; the mulberry and the vine are extensively cultivated, and wheat is the grain chiefly grown. This belt includes the greater part of the Swiss plain, and sinks to its lowest level in the Valley of the Rhine, between Constance and Basel, and the banks of Lake Zürich and the Lago Maggiore. In this last district, the vegetation is that of n. Italy. At a higher elevation than 6,400 ft., S. is inhabited only by herdsmen during the summer months: at this limit, however, permanent abodes begin to make their appearance; and at 4,000 ft. there are many villages. The most populous part of S. is between 1,250 and 2,150 ft.; the temperature of this region is fairly represented by that of Zürich. The temperature of Zürich is in winter 30·34°; in spring, 47·25°; in summer, 64·15°: in autumn, 49·05°: for the year, 47·95° The temperature of London is in winter, 38·22°; in spring, 48·34; in summer, 61·74°; in autumn, 50·29°: for the year, 50·50°.

Productions.—In S., where good coal is not to be had, and where the houses are of wood, the forests, which cover one-sixth of the whole surface, acquire very great importance. Wood-cutting is one of the chief employments. The trees cut down in the highlands are deprived of their branches, and shot with inconceivable rapidity over the slopes to the valleys below, whence they are removed by rafts to different parts of S., and to France and Germany. It is, however, the mountain-pastures and the meadows, forming two-fifths of the whole surface of the country, that supply the most important occupations of the people —those of herdsmen and shepherds. During summer, the cattle are driven into the mountains, and tended by herdsmen, who take up their abode in the rude wooden huts known as *châlets*, and there the butter and cheese are made. In summer, it is estimated that there are in S. more than a million of horned cattle, one-fourth of which are milk cows. The produce of the dairy annually is valued at 5 to 10 millions dollars. The best breeds of cattle are those of Saanen and Simmenthal in Bern, Gruyères in Freiburg, Schwyz, Zug, Entlebuch, Pralligau in the Grisons, and Glarus. The best cheese is made at Emmen, Saanen, Simmenthal, Gruyères, and Ursern. The sheep of S. are of inferior breed, and their wool is short and coarse; but the goats are numerous and fine. More than two-thirds of S. does not supply corn enough to feed its inhabitants. The plain, however, is a fertile agricultural country. In Vaud and Neufchatel, cultivation of the vine is the chief occupation; and in the Thur hill-country, particularly on the shores of the Lake of Constance, are extensive orchards, in which are prepared cider and *kirschwasser*, the latter a liquor largely consumed in S. Out of every 100 sq. m. of surface, 30 are occupied by rocks, glaciers, and water; 20 by hill-pastures; 17 by forests; 11 by arable lands; 20 by meadows; and 1 by vineyards. In the uncultivated part of the country, the bear, the wolf, and the larger birds of prey are still found; and the Chamois

(q.v.) is hunted. The rivers and lakes abound with fine fish, especially trout.

Finances.—In 1889 the govt. receipts were $13,114,340; expenditures $12,887,121; debt (1890, Jan. 1) $11,804,727; receipts 1900, $20,206,743; expenditures, $20,551,567; debt (1902), $13,600,000. Each canton has its own budget of revenue and expenditure and its own debt, all independent of the federal finances.

Manufactures.—The manufacturing districts are not scattered over the whole country; but are mostly on the n. frontier. The chief manufactures are: at Zürich, silk-stuffs, to the value of $8,000,000 annually, and cottons; at St. Gall and Appenzell, cottons; in Aargau and Glarus, cottons, linens, silks, and hosiery; at Basel, silk-stuffs to the value of $7,000,000, leather, paper, and tobacco; in Aargau and Lucerne, straw-plaiting; in Neufchatel, watch-making and cotton-printing; in Geneva, watch-making and jewelry.

Commerce.—Although S. is inland, its commerce in proportion to population has long exceeded that of any other continental country. In 1900 the special imports aggregated $174,000,000, and the exports $231,000,000. The chief imports in order were food, including wine and spirits, silk, precious metals, cotton, wool, cattle, minerals, excluding metals; iron, chemicals, and clothing: chief exports were silk goods, cotton goods, watches, clocks, and component parts, food, including wine and spirits, and precious metals. Exports to the United States were (1902-03) $21,183,378; imports $205,647.

Railroads, Telegraph and Post-office.—In 1901 there were 2,490 m. of railroad, which by law of 1898 have become state property. The telegraph system comprised 4,095 m. of state line, 1,477 of railway and private line and 230 of cable, etc., lines—total 5,512 m.; dispatches handled 3,914,994. There were 19,875 m. of telephone lines. The post-office handled 102,223,725 letters and 43,432,285 postal cards, 12,132,631 domestic and foreign newspapers and samples, and 1,630,026 parcels. Internal communication has long been facilitated in S. by excellent roads, and every advantage has been taken of the lakes to introduce steam-navigation.

Government.—Hitherto, the Swiss have been much separated into distinct communities by the great mountain-chains which separate the cantons. One of the results has been the weakness of the central power. Each valley has been intrusted with making its own laws, and the management of its own local affairs. The cantons are, in fact, to this day in a great measure separate states. They are divided into two classes, absolute democracies and representative democracies. In the former, the chief power belongs to the *Landesgemeinde*, an assembly of the whole adult male population, which meets once a year, to pass laws, and to regulate the taxes and expenditure of the canton. Uri, the Unterwaldens, Appenzell, and Glarus have constitutions of this kind. In the Grisons and the Valais, the people may be said to possess similar powers, as

all measures must be approved by them. In the other, the representative cantons, a great council is elected by the people, and to it are deputed most of the powers of the Landesgemeinde. These local assemblies produce a remarkable effect on the Swiss people. Their debates have an importance beyond that of a colonial parliament, for their power is much greater, and the population are more immediately interested in them. To the interest that they excite may be attributed in a great degree the intelligence and public spirit of the Swiss. Their greatest disadvantage lay in the power that the cantons formerly had to levy war against each other, and to resist the general government in conducting the foreign policy of the country. But these defects were to a great extent remedied by the constitution of 1848, which forms the basis of the present constitution, dating from 1874. It handed over the control of the army, the conduct of foreign affairs, the settlement of disputes between the cantons, and the management of the police and post-office, to a federal assembly (*Bundes Versammlung*) representing all the cantons. How far this assembly is entitled to interfere with the legislative action of the cantons has not been distinctly defined; but the tendency of legislation since its formation has been somewhat to trench on their prerogatives. The federal assembly consists of two chambers—1st, the State Council (*Stände Rath*); 2d, the National Council (*National Rath*). The former is composed of 44 members, 2 representing each canton, elected for 3 years by the cantonal assemblies; the latter, of 167 members, elected directly by the people for 3 years, in the proportion of 1 to 20,000 inhabitants. These bodies depute the executive authority to the federal council (*Bundes Rath*), consisting of seven members, and holding office 3 years. The pres. and vice-pres. of the federal council are the first magistrates of the republic. There is also a court called the federal tribune (*Bundes Gericht*), which acts as a high court of appeal, and consists of 16 members and 9 substitutes elected by assembly. Different systems of law still prevail in the different cantons, which to some extent resemble each other, the most of them having grown out of the old German codes. Except in a few frontier cantons, the Roman law has been little regarded. Until 1874, the law of the Rom. Cath. cantons prescribed, for certain offenses, various degrees of corporal punishment, exposure on the pillory, and public penance in the churches; but in that year capital and corporal punishments were abolished throughout the confederation. In 1879 the cantonal governments were granted the right to restore capital punishment. In S., property is much subdivided; of 485,000 heads of families, about 465,000 possess landed property.

A peculiarity of the existing Swiss constitutions, federal and cantonal, is the *Referendum*, an institution whereby the people are enabled to approve or veto all laws. In some of the cantons all bills or laws of the cantonal council *must* be submitted to the people: this is the 'obligatory' Referendum. In other cantons the Referendum is 'facul-

tative' only—i.e., bills must be submitted to the people on formal demand of a certain number of electors. There is facultative Referendum with regard to all federal laws: they must be submitted to popular vote on demand of 30,000 electors or of 8 cantons. When by obligatory or by facultative Referendum a project of law, or a bill, after discussion in cantonal council or in federal assembly, is submitted to the judgment of the people, the voter writes 'yes' or 'no' on a printed voting paper and deposits that in an urn under official control. When 50,000 electors, or either house of the federal assembly, demand a revision of the federal constitution, the question of revision (and afterward the draught of the amendments) must be submitted to the people. It is seen that by the Referendum both the veto power and (largely) the initiative in legislation are held in the hands of the people themselves. The wisdom of the framers of the Swiss constitutions in thus approaching the model of pure democracy is proved by the result, for in the 12 yrs. immediately succeeding the allowance of the Referendum with regard to federal laws (1874—86) only 19 out of 107 federal laws or bills were challenged by the people or the cantons, and of these 6 were approved and 13 vetoed.

There is no standing army, but every citizen is obliged to serve as a soldier, and military drill is taught at all the schools. It is estimated that in war S. could speedily put 250,000 trained soldiers in the field.

Language and Religion.—In the sequestered valleys of the Grisons, two-thirds of the population still speak a Latin dialect known as the Romaunsh; Italian dialects have penetrated up the valleys of Ticino; French patois has invaded western S., by the Rhine and the valleys of the Jura, to Laufen, the frontier of Soleure, Lake Morat, the Upper Saane, and Siders in the Valais. In the rest of S. the dialects are German. Of every 1,000 Swiss, 713 speak German, 213 French, 56 Italian, and 14 Romaunsh. The Reformation in S. spread chiefly from Basel, Bern, and Geneva, and the chief Prot. districts are the countries communicating with these towns. The Alpine region is almost entirely Rom. Cath., the seven Rom. Cath. cantons being Lucerne, Zug, Schwyz, Uri, Unterwalden, Valais, and Ticino. Out of 1,000 Swiss, 411 are Rom. Catholics, 587 Protestants, and 2 Jews.

Education.—In no country is elementary instruction more widely diffused: parents are compelled to send their children to school, or have them privately taught, from the age of 6 to 12. There are universities on the German model at Basel, Bern, and Zürich; and on the French plan a univ. at Geneva and academies at Lausanne and Neufchatel. The number of clubs for scientific and literary, musical and social purposes, is remarkable. There are few scholarly pursuits not represented by societies in S. The local political assemblies and other public meetings give ample employment to the newspaper and periodical press. In S. there are 500 journals and reviews, 250 being political journals, and the remainder literary and

scientific. There are 40 daily papers. This active intellectual life is chiefly in the Prot. cantons.

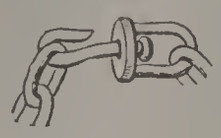
History.—S. was in Roman times inhabited by two races —the Helvetii, supposed to have been Celts, on the n.w., and the Rhætians (of unknown origin) on the s.e. After the conquest of Gaul, both races adopted the language and habits of Rome. When the invasions took place, the Burgundians settled in western S.; while the Alemanni, another Germanic tribe, took the country e. of the Aar. A third Teutonic people, the Goths, entered from Italy, and took possession of the country of the Rhætians, which nearly corresponded with the Grisons. The Burgundians adopted Christianity in the end of the 5th c.; the Helvetii retained their pagan creed until the 7th c., when they were converted by Irish monks, who founded abbeys and churches, which still exist. S., in the early middle ages, formed part of the German empire, and feudalism sprang up in the Swiss highlands even more vigorously than elsewhere. During the 11th and 12th c., the greater part of S was ruled on behalf of the emperors by the lords of Zähringen (q.v.), who did much to check civil wars and to promote the prosperity of the towns. They, however, became extinct 1218, and then the country was distracted by wars among the leading families. The great towns united in self-defense, and many obtained imperial charters. In 1273 Rudolf of Hapsburg, Swiss nobleman who had favored the independence of the towns, became German emperor. After doing so, he continued the same policy; but his son, Albert I. (q.v.), took another course. He attacked the great towns, and was defeated. The leading men of the Forest Cantons, which for ages had yielded a merely nominal recognition of the empire, and had acknowledged no feudal superior, met on the Rütli meadow 1307, Nov. 7, and resolved to expel the Austrian bailiffs or landvögte: see TELL. The war terminated in favor of the Swiss at Morgarten 1315. Schwyz, Uri, and Unterwalden, with Lucerne, Zürich, Glarus, Zug, and Bern, eight cantons in all, 1352, entered into a perpetual league, the foundation of the Swiss Confederation. Wars with Austria followed, which terminated favorably for the confederates at Näfels (q.v.) and Sempach (q.v.). In 1415 the people of the cantons became the aggressors. They invaded Aargau and Thurgau, parts of the Austrian territory, and annexed them: three years later, they crossed the Alps, and annexed Ticino, and constituted all three subject states. The Swiss were next engaged in a struggle on the French frontier with Charles the Bold of Burgundy. They entered the field with 34,000 men, to oppose an army of 60,000, and were successful, gaining the famous battles of Granson and Morat 1476. In 1481, the towns of Freiburg and Soleure were admitted into the confederacy. In 1499 Emperor Maximilian I. made a final attempt to bring S. again within the bounds of the empire. He sought to draw men and supplies from the inhabitants for his Turkish war; but in vain. He was defeated in six desperate engagements. Basel and Schaffhausen (1501), and Appen

zell (1513), were then received into the Confederation, and its true independence began. The abbacy of St. Gall, the cities of St. Gall, Mühlhausen, and Bienne, became associated states, with a vote at the diet. Geneva, Neufchatel, Valais, and the Grisons, also became associated states, but without a vote.

New troubles sprang up with the Reformation. Zwingli began to preach in the beginning of the century; and Zürich, 1523, adopted his opinions, and was followed by Bern and other cantons of the north. The Forest Cantons remained attached to the Church of Rome. War broke out 1531, between the Rom. Catholics and Protestants, and the Rom. Catholics were successful at Cappel, where Zwingli was slain. This victory to some extent settled the boundaries of the two creeds in eastern S. In 1536, however, Bern wrested the Pays de Vaud from the Dukes of Savoy, and annexed it. In the same year, Calvin settled at Geneva, and the Reformed doctrines spread throughout Western S. During the Thirty Years' War, Bern—which had become, since the conquest of Vaud, the leading canton—and Zurich, contrived to maintain with great skill the neutrality of S.: and in the treaty of Westphalia, 1648, it was acknowledged by the great powers as a separate and independent state. At this period, the Swiss, in great numbers, were employed as soldiers in foreign service, and the record of their exploits gives ample evidence of their courage and hardihood. Internally, there was great stagnation. The constitution of the larger cantons became more aristocratic, i.e., the mass of the people lost their power over the governing bodies. In Zürich, Schaffhausen, and Basel, the governing councils were elected by the corporations; and in Bern, Freiburg, Soleure, and Lucerne, a few families had acquired permanent rule. At the end of the 18th c., there was widespread discontent with this state of matters; but the French Revolution of 1789 broke out, and wars followed, which precluded its manifestation. In 1798, S. was seized by the French. At the peace of 1815, its independence was again acknowledged. The new Confederation was divided into 22 cantons, each represented in a diet, which was appointed to hold its annual meetings alternately at Bern, Zürich, and Lucerne. The old abuses which had crept into the constitutions of the cantons were revived, and representation in most of them became based on property qualifications. Officials, the aristocracy, and the clergy joined to oppose innovations, and succeeded in doing so until 1830, when the French Revolution of 1830 broke out: then armed demonstrations were made against the towns, and universal suffrage was generally conceded. Basel town, however, held out: but the difficulty was settled by separation of the town and country districts—the former remaining conservative, the latter becoming democratic. Geneva and Neufchatel retained their old constitutions. The result of the changes was, however, that two-thirds of the whole population were allowed to take part in public affairs. The consequences were not what had been

expected by the liberals, who found that they had not yet the means of strengthening the central power. In 1839, at Zurich, where Dr. Strauss (q.v.) had been appointed prof. of theology, a mob of peasants, headed by the Prot. clergy, overturned the government. In Aargau, a struggle between the liberals and the ultramontane party was settled, after long discussion, by an unsatisfactory compromise. In Valais, where universal suffrage had put power into the hands of the reactionary party, a war ensued, in which the reactionaries were victorious; they then ruled with a strong hand, and actually forbade Prot. public worship within the canton. In Lucerne, the headquarters of the Jesuits, the Ultramontane party acted even more extravagantly; they so persecuted their political opponents that the latter were compelled to leave the canton. These measures caused deep and wide discontent. In 1844, a proposal was made in the diet to expel the Jesuits; but that body declined to act. The radical party then resorted to force: they organized bodies of armed men, called the Free Corps, which invaded the Rom. Cath. cantons; but they were defeated. Changes favorable to them took place in some of the cantons. The Rom. Cath. cantons then formed a league, the Sonderbund, for defense against the Free Corps. There was general clamor for its suppression; but, in the diet, only 10½ votes supported that measure The ruling party in Geneva had been with the majority, and this conduct led to a revolution in that city. One vote was thus gained against the Sonderbund. St. Gall added another; and a majority in the diet, 1847, declared the illegality of the Sonderbund, and decreed the expulsion of the Jesuits. In the war which ensued between the federal army and the forces of the Sonderbund, the former were victorious at Freiburg and Lucerne. The leagued cantons were made liable in all the expenses of the war, the Jesuits were expelled, and the monasteries were suppressed. An attempt was made by diplomatic notes from other countries to intimidate the Swiss govt.; but the revolution of 1848 broke out, and prevented further interference. In the same year, the radical party, convinced of the necessity of a more powerful central government, carried the constitution of 1848. Subsequently, a rebellion took place against the king of Prussia, as Prince of Neufchatel, and that canton was declared a republic, with a constitution similar to that of the other Swiss states. The king of Prussia protested in vain; but 1857 he withdrew all opposition, and remained satisfied with the bare title Prince of Neufchatel, which he still retains. The new federal constitution adopted 1874 confers greater power on the federal body, and reduces that of the several cantons.

SWIVEL, n. *swĭv'l* [Icel. *svif*, sudden movement; *sveifla*, to swing in a circle: Norw. *sviv*, swing; *sveiva*, the crank or handle of a wheel]: a fastening contrived to allow the thing fastened to turn freely round on its axis; a ring which turns on a staple; a small cannon on a pivot or staple, or on two concentric iron rails, and which may be turned in any direction: V. to turn on a pin or pivot. SWIV'ELLING, imp. SWIVELLED, pp. *swĭv'ld.*


Swivel.

SWOLLEN, or SWOLN, v. *swōl'n:* pp. of the verb SWELL, which see: ADJ. largely increased in bulk.

SWOON, v. *swôn* [AS. *swindan*, to consume, to languish: OHG. *swindan*, to languish, to pine: Bav. *schwund*, waste: Ger. *schwinden*, to die away: Gael. *suain*, profound or deep sleep]: to sink into a fainting fit, and appear as if dead: N. a fainting fit. SWOON'ING, imp.: N. act of one who swoons. SWOONED, pp. *swônd.*

SWOOP, v. *swôp* [from SWEEP, which see]: to take or seize with a sweeping movement; to catch while on the wing; to catch up: N. a sweeping movement; a sudden falling on and seizing, as a bird of prey on its victim. SWOOP'ING, imp. SWOOPED, pp. *swôpt.*

SWOP, v. *swŏp* [another form of SWAP: W. *chwap*, a sudden stroke or blow]: to exchange; to barter: N. an exchange; a barter. SWOP'PING, imp.: N. the act of exchanging or bartering. SWOPPED, pp. *swŏpt.*

SWORD, n. *sōrd* [Ger. *schwert;* Dut. *zwaard;* Dan. *sværd;* Icel. *sverd*, a sword]: weapon consisting of a long knife-like blade of steel, one side—and sometimes both sides—having a sharp cutting edge, and set in a hilt or handle—used, with a motion of the whole arm, for stabbing and cutting: *figuratively*, destruction by war; vengeance or justice; emblem of power or of triumph; the profession of arms.—The S. was in use when history began. Damascus and Toledo blades have been brought to such perfection that the point can be made to touch the hilt and to fly back to its former position. In the 18th c. every gentleman wore a sword; now its use is almost confined to purposes of war. In the army, all officers and sergeants, with troopers of cavalry, wear swords for cutting and thrusting. In the navy, all officers wear similar swords: and the men, in time of action, heavy-backed swords, called *cutlasses.* In the French service, nearly all troops wear a combination of the sword with the Bayonet (q.v.), called a sword-bayonet.—See RAPIER: CUTLASS: BROADSWORD: SCIMITAR: SABRE: FENCING: also consult Capt. Burton's *Book of the Sword* (I. 1884). SWORDER, n. *sōrd'ĕr*, in *OE.*, a cut-throat; a soldier. SWORD'LESS, a. *-lĕs*, without a sword. SWORD-ARM, the right arm. SWORD-BAYONET, bayonet having a shape somewhat like a sword. SWORD-BEARER, city officer who carries the sword as the emblem of authority and justice before the chief magistrate. SWORD-BELT, belt round the waist from which the sword is suspended. SWORD-BLADE, knife or cutting part of a sword. SWORD-CUT, a wound

with a sword. SWORD-DANCE, in *Highlands of Scot.*, dance performed over two swords laid crosswise on the ground. SWORD-FIGHT, combat in which swords are the weapons. SWORD-SHAPED, a. shaped like a sword; ensiform. SWORDSMAN, one skilful in the use of the sword. SWORDSMANSHIP, n. skilful use of the sword. SWORD-STICK, or SWORD-CANE, walking-stick in which a sword is concealed. SWORD OF STATE, the sword borne on great occasions before kings, lords, magistrates, etc. TO SURRENDER HIS SWORD, to submit on defeat to the conqueror by the vanquished commander delivering his sword. TO BREAK HIS SWORD, to degrade him from his rank.

SWORD'-FISH (*Xiphias*). typical genus of fishes of family *Xiphiidæ*, having the upper jaw remarkably elongated and compressed, in the form of a sword or dagger. The body is long in the common S.-F. (*X.gladius*). attaining 10–15 ft., and the sword 3 ft. Except in a young stage, it has no teeth and scales; and the dorsal fin is long and continuous in the adult. It is without a ventral fin. It is plentiful in the Mediterranean, and in the Pacific and Atlantic, occuring abundantly on our s. coast from Nova Scotia to New York. It is bluish black above, and silvery white on the belly, one color passing gradually into the other. It is highly esteemed for food, both fresh and salted. It is harpooned by fishermen, and is powerful enough to drag a boat for hours after being struck. It attacks the whale with this formidable weapon, often killing the cetacean with repeated stabs. It preys much on mackerel. Instances are not rare of ships' bottoms being perforated by the sword, and small boats are easily pierced by it. Instances are on record of the piercing through copper sheathing, oak-plank and timber, as far as 10 inches; and Prof. Owen compares such a stroke to the impact of a heavy artillery projectile. Usually the part which enters a ship's side cannot be withdrawn, and remains in the wood.—On the coasts of the United States the species attains 7 to 12 ft. in length and 400 lbs. weight. About 50 schooners in this fishery annually take about 3,400 fish, of value about $45,000.

SWORE, v. *swōr:* pt. of SWEAR. SWORN, v. *swōrn*, pp of SWEAR, which see.

SWOUND, n. *swownd* [for SWOON]: in *OE.*, a swoon; a fainting fit.

SWOUNS, n. plu. *swownz* [corrupted from GOD'S WOUNDS]: in *OE.*, an oath by *God's wounds*, that is 'Christ's wounds': also ZOUNDS.

SWUM, v. *swŭm:* pt. and pp. of SWIM, which see.

SWUNG, v. *swŭng:* pt. and pp. of SWING, which see.

SYBARIS, *sĭb'ā-rĭs*, and CROTON, *krō'ton* (or CROTO'NA): two celebrated Greek colonies in Magna Græcia (q.v.). Sybaris—founded B.C. 720, by Achæans and Trœzenians—was in the s. of the Lucanian territory, between the rivers Crathis (*Crati*) and Sybaris (*Coscili*), about 3 m. from the Tarentine Gulf; and Croton—founded B.C. 710, by Achæans—about 50 m. s.s.e. on the coast of Bruttium. All that is certainly known concerning these cities before the destruction of Sybaris is that they both rapidly increased in size, wealth, and power, extending their dominions across the peninsula, and founding other colonies, while on friendly terms with each other. Sybaris is said to have been 6 m. in circumference, and Croton 12 m.; Sybaris being notorious for the excessive and fastidious luxury of its inhabitants (hence the term Sybarite), and the Crotoniates noted for their perfection in athletic exercises—the famous athlete Milo (q.v.) having been a native of Croton. Between B.C. 540–530, Pythagoras (q.v.) settled at Croton, and exercised great influence over the aristocratic government. Sybaris (B.C. 6th c.) was probably far the most opulent and splendid of Hellenic cities. About B.C. 510, a democratic leader, Telys, deposed the oligarchy of Sybaris, banished 500 of the leading citizens, and assumed the tyranny of the city. The banished citizens having taking refuge in Croton, Telys demanded their surrender; and being refused, declared war against that city. The Sybarites, with an army said to have amounted to 300,000, met 100,000 Crotoniates, commanded by Milo, at the river Træis, were completely routed, and their city was razed to the ground, and obliterated by their adversaries changing the course of the Crathis so as to sweep it away. About B.C. 443, Thurii was founded near the site. After the destruction of Sybaris, Croton appears to have gradually declined, suffering from internal convulsions (see PYTHAGORAS), as well as from disasters in its wars with the Locrians, Rhegians, B.C. 480, and Bruttians, also in the wars of Dionysius (q.v.) of Syracuse and Pyrrhus (q.v.). Its ruin was completed in the second Punic war; and though, B.C. 194, it was colonized by Roman citizens, it never again rose to importance. Croton in the time of Herodotus, and later, was famous for a medical school.—The modern town Cotroné stands very near the ancient site; pop. 6,878.

SYBARITE, n. *sĭb'ă-rīt:* inhabitant of anc. *Sybaris* (q.v.), in Italy, noted for its luxury; an effeminate voluptuary. SYB'ARIT'IC, a. *-rĭt'ĭk*, pertaining to or resembling a Sybarite. SYB'ARIT'ISM, n. *-ĭzm*, luxuriousness; effeminacy.

SYBO, n. *sī'bō*, SYBOES, n. plu. *sī'bōz* [F. *ciboule*—from L. *cepa*, an onion]: in *Scot.*, a young onion before the bulb has been formed; also spelled SEIBOW, n. *sī'bō*, and SEBOW, n. *sē'bō*.

SYCAMINE, n. *sĭk'ă-mīn* [Gr. *sūkamīnos*]: supposed to be the black mulberry-tree, but the species is uncertain; the *Mōrus nĭgra*, ord. *Morāceæ:* see MULBERRY (Black).

SYCAMORE: a name applied originally to *Ficus Sycomorus*, a tree known in biblical times and places, and the legendary one chosen by Zacchæus to climb into for a sight of the Saviour. It is a species of fig and an evergreen timber tree flourishing in Egypt and which supplied an inferior coarse-grained wood for ordinary purposes and for mummy cases. A famous Egyptian statue of an old man was carved out of a block of sycamore wood about 4000 B.C. The thick foliage, resembling that of the mulberry, makes the sycamore a desirable shade-tree, and it is still planted for this reason in Egypt. The fruit is borne directly on trunk and branches, edible and sweet-flavored, and is a large item of food among the lower classes. The ripening of the figs is hastened by making incisions in the apexes. In the middle ages the European *Acer pseudo-platanus*, was selected to represent the tree of Zacchæus in the old miracle plays, on account of its dense foliage. It is a tall, very handsome tree of quick growth and living for perhaps 200 years. The leaves are large and have acute lobes, somewhat resembling those of the plane, and the yellowish flowers droop in terminal racemes. The bark is smooth, often peeling off in large flakes, leaving patches of lighter shade, and sap is saccharine and the wood is hard and white, although with a brownish heart, and takes a fine polish, being used by wheelwrights, turners, cabinet-makers, and wood-carvers, and for musical instruments. Sycamore endures sea and mountain winds better than most timber trees, and is therefore planted for its shade in exposed places. Certain of these trees in Scotland were known as dool-trees, or grief-trees, because they formed informal gibbets on which to hang the enemies of powerful barons.

Perhaps because the likeness in foliage and the stripping of the bark, the name of sycamore has been again transferred to the American plane-tree (*Platanus occidentalis*) better called buttonwood. This is one of the largest American trees with awkward, twisted, wide-spreading limbs which, however, when the tree is fully leaved out forms a broad pyramidal head. The bark is smooth, that of the upper portion flaking off in pieces each year, and leaving whitish patches, which are very conspicuous in winter. The large leaves range from simple coarse-toothed, to distinctly deltoid and three-lobed blades. The flowers are clustered in compact round balls, with from three to eight minute petals and sepals; the fruit-heads retain this globose form and are composed of obpyramidal nutlets, having long nearly erect hairs at the base. They are usually solitary, and swing on long peduncles during the winter, only falling apart in the early spring. The reddish-brown wood is chiefly useful for cigar-boxes, and is compact and difficult to split or to work.

The Australian sycamores are *Sterculia lurida*, and the white sycamore *Cryptocarya obovata*, one of the

native nutmegs, and a large tree yielding serviceable white timber. *Melia Azedarach* is the false sycamore, the large tree more commonly known as the pride-of-China tree.

SYCAMORE: Ill.; city, county-seat of DeKalb co.; on the Chicago & G. W. and the Chicago & N. W. railroads; about 55 m. w. of Chicago. The city was founded in 1836. It is in an agricultural and stock-raising region, and has considerable manufacturing interests. The chief manufacturing establishments are flour mills, insulated wire works, brick and tile works, soap factories, wagon and carriage works, agricultural implement works, varnish and furniture factories, and creameries. There are large establishments for preparing fruit and vegetables for shipment. The government census of 1900 gives 82 manufacturing establishments, with an invested capital of $503,733. The annual value of the products is given as $1,367,655. There are 12 churches, a young ladies' seminary, and public graded schools. The national bank has a capital of $50,000; there is also a private bank. Pop. 4,000.

SYCHNOCARPOUS, a. *sĭk-nō-kâr'pŭs* [Gr. *suchnos,* frequent; *karpos,* fruit]: in *bot.,* possessing the power of producing fruit many times without perishing, as is the case with all trees and herbaceous perennials.

SYCITE, n. *sī'sīt* [Gr. *sukitēs,* fig-like; *sukon,* a fig]: a nodule or pebble resembling a fig.

SYCOMA, n. *sī-kō'mă* [Gr.—from *sukon,* a fig]: a fig-shaped tumor.

SYCOMORE, n. *sĭk'ō-mōr* [Gr. *sukomorŏs,* the fig-mulberry—from *sukon,* a fig; *moron,* a mulberry]: large tree allied to the common fig, whose fruit, shaped like the fig, has a sweet and delicate taste—found in Egypt and Syria. See SYCAMORE (usual though less correct spelling): also FIG.

SYCONUS, n. *sĭ-kō'nŭs,* or SYCO'NIUM, n. *-nĭ-ŭm* [Gr. *sukon,* a fig]: in *bot.,* an aggregate fruit where many flowers have been developed upon a fleshy receptacle, which is either a flattened disk or forms a nearly closed cavity, as in the fig.

SYCOPHANT, n. *sĭk'ō-fănt* [L. *sycophan'ta;* Gr. *sukophan'tēs,* one who informed against those who exported figs from Attica contrary to law, a tale-bearer—from *sukon,* a fig; *phainō,* I show]: a flatterer of princes and great men; a parasite; a mean or servile flatterer. SYC'OPHANCY, n. *-făn-sĭ,* obsequious and mean flattery; servility. SYC'OPHAN'TIC, a. *-făn'tĭk,* flattering meanly; parasitic. SYC'OPHAN'TISH, a. *-tĭsh,* like a sycophant. SYC'OPHANTISM, n. *-tĭzm,* mean flattery; sycophancy.

SYCOSIS, n. *sī-kō'sĭs* [Gr.—from *sukon,* a fig]: a skin disease, characterized by the formation of patches of tubercles on the skin of the chin or upper lip.

SYDENHAM. *sĭd'ĕn-ăm:* chapelry in the parish of Lewisham, county of Kent, England, with a station on the London and Croydon railway; 8 m. s. of London, of which it is a pleasant suburb. The Crystal Palace was erected here (not within the exact boundary of S.) 1854, chiefly from the materials of the building of the Great Exhibition (1851). The cost of the erection and appointment of the Crystal Palace amounted to nearly £1,500,000. The building is 1,600 ft. long, 380 wide, and at the centre transept 200 ft. high. The chief arts and sciences illustrated by the collections within the Palace and grounds, are Sculpture, Architecture, Painting and Photography, Mechanics and Manufactures, Botany, Ethnology, Paleontology, Geology, and Hydraulics. There are two concert-rooms, within the larger of which performances have taken place at which there were 5,000 vocalists and instrumentalists. The park and gardens occupy nearly 200 acres, and are adorned with sculptures, stone balustrades, etc., and fountains perhaps the finest in the world. Pop. (1901) 43,630.

SYDENHAM, THOMAS, M. D.: great English physician: 1624-1689, Dec 29; b. Winford Eagle, Dorset; of good parentage. He was educated at Magdalen Hall, Oxford. A French writer states that he afterward studied at Montpellier. He graduated at Oxford as bachelor in medicine 1648. Through the interest of a near relative, he obtained a fellowship of All Souls College, and there continued his medical studies. He left the univ. without taking a doctor's degree, which long afterward he took at Cambridge. He settled as a practitioner at Westminster, and practiced so successfully that, when only 36 years of age, he had gained the reputation of being one of the first physicians of the period. In his later years, he was much afflicted by gout, of which he died. S. was not profoundly accomplished as a man of science; even in his own times he was inferior to several of his contemporaries; but in sagacity of observation and accuracy of diagnosis, he was unsurpassed. He was exceedingly independent and plain-speaking, eschewed all pretentious mystery, followed common sense and cured his patients—using as little medicine as possible. This practice—on principles which the medical profession has since largely accepted—aroused great distrust and opposition from the medical faculty of his time. Many anecdotes are current, illustrating his peculiar directness and independence. His skill and his philosophic cast of mind secured him the admiration and friendship of Locke; and his contributions to medical literature received the praise of Haller and Boerhaave. His writings have been often republished in England and on the continent, the ed. entitled *Opera Medica* (Geneva 1716) being the best. He gave attention first to fevers, publishing 1666 his famous treatise *Methodus Curandi Febres Propriis Observationibus Superstructa*, reprinted 1675, with additions. His treatment of the then destructive malady of smallpox was especially felicitous substituting for the stimulating regimen in vogue the

antiphlogistic method of cool air and salines. The most scholarly translation of his works into English is that of Dr. R. G. Latham, in the Sydenham Society's series.

SYDNEY, *sĭd'nĭ:* town, seaport, and cap. of Cape Breton co., Nova Scotia; on Cape Breton Island, Sydney Harbor; and on the Sydney and Louisburg and the International railroads; 5 m. from N. Sydney, 285 m. from Halifax. It has an excellent harbor; valuable coal mines 18 m. distant; railroads connecting with all the N. S. coal-mining centres; large export trade in coal, butter, and cattle; 6 churches, co. court-house, and 3 weekly newspapers; and weekly steamer communication with Halifax. —North Sydney (esti. pop. 4,650) is connected with it by daily steamer, has important commerce, fisheries and coal trade. Pop. of S. (1891) 2,426; (1901) 9,909.

SYD'NEY: city, cap. of New South Wales, and the oldest city in Australia; on the s. shores of Port Jackson, a magnificent harbor; lat. 32° 52′ s., long. 151° 11′ e. The first party of British settlers that reached New Holland were landed at Botany Bay (q.v.) 1788, Jan. 20. The spot which they selected being found ineligible, it was abandoned a few days afterward, and the settlement was transferred about seven m. n., where S. now stands. The locality was chosen chiefly because of a stream of fresh water there, flowing into the deep inlet known as Sydney Cove, one of the numberless bays into which the basin of Port Jackson is divided. This basin or harbor is a magnificent expanse of water, completely land-locked, admitting vessels of the largest size; extends—with a varying width, scarcely anywhere exceeding 1 m., and generally much less—about 20 m. inland, ramifying irregularly in every direction. Its bold and rocky shores present a succession of picturesque and beautiful landscapes. The cliffs which form the general outline of this harbor often rise 200 to 250 ft. At other points the coast presents a lower level, consisting of a series of terraces and smooth sandy beaches. Not many places on the globe are more obviously suitable for a great metropolis. The whole circumference of the bay round which S. is built—about 8 m. from the sea—forms a series of natural wharves, where vessels of 2,000 tons burden can be moored within 60 ft. The narrow entrance (1 m. wide) of Port Jackson—through what is called the 'Heads'—can easily be made inaccessible to any hostile fleet; while the central position of S makes it necessarily the permanent emporium of the greater number of the British dependencies in the southern hemisphere. The immense coal formation of E. Australia extends n. and s. about 500 m., with a breadth of 80 to 100 m. S. stands nearly in the centre of this great carboniferous basin; and at various points within a radius of 30 to 100 m., large quantities of coal are raised for colonial consumption and for export. The sandstone rock on which the city stands affords valuable material for building.

For many years S. held a monopoly of the commerce of these antipodean regions; it has now formidable rivals in Melbourne, Adelaide, and the settlements of Queensland.

l must, however, remain the exclusive outlet for the productions and commerce of extensive pastoral and mineral districts on the n.w., w., and s.w. The e. shore of Darling harbor has its frontage entirely occupied with wharves and quays.

The streets in the older parts of the town are narrow and irregular; but several of the modern streets, in their breadth and the size and style of the buildings, are not inferior to those of the principal towns of Europe. The shops, warehouses, and private buildings in George and Pitt streets present long and compact lines of well-built stone edifices, often in very ornate and ambitious architecture. The chief thoroughfares are paved, and lighted with gas, and a system of underground drainage has been carried out at a cost of nearly half a million sterling. There is an abundant supply of pure water from a natural reservoir. There are numerous parks near the city. The Botanical Gardens, finest in the colonies, cover 38 acres. Sydney has one ship-building establishment. The Fitzroy Dry-dock, originally intended for vessels of the royal navy, can take in vessels of the largest size. Port Jackson is strongly defended by heavy batteries and submarine mines. It is the chief British naval depot in Australasia. The *climate* of Sydney is, on the whole, temperate and healthful.

Among public buildings, by far the most important, not only in Sydney but in the whole of Australia, is the university, on a commanding height, in a domain of about 150 acres. The principal façade is 500 ft. in length, and is flanked at its w. end by the Great Hall, of such proportions that, were it in England, it would rank third in size. There are three suffragan colleges (denominational) affiliated with the university—St. Paul's (Anglican), St. John's (Rom. Cath.), and a Presbyterian college. Other notable public buildings are the royal mint, free library, national gallery, and the observatory. The metropolitan Cathedral of St. Andrew is a handsome building in the later Perpendicular style. Many of the churches, more than 120 in number, of various religious denominations, are tastefully designed. Among buildings for secular purposes, the most imposing and effective, in size and architecture, are the residence of the governor, the exchange, the custom-house, the town-hall, the new post-office, and the public grammar-school. The neighborhood of Sydney, with every nook in the adjacent bays, is studded with elegant villas and snug cottages, surrounded by their park-like grounds, and gardens of orange-trees, bananas, and numberless semi-tropical plants unfamiliar to the English eye of the newly arrived immigrant. There are numerous manufactories; one with 350 hands makes boots and shoes, and 32 make clothing; one steam joinery employs 250 hands. Sydney has three theatres, several mechanics' institutes, several hospitals for the sick, an orphan asylum, and other charitable and benevolent institutions. In 1879

Sydney successfully carried out its International Exhibition on a large scale. Pop. (1901) 496,990.

SYDNEY MINES: Canada; town in Cape Breton Island and county, province of Nova Scotia, on the northern arm of Sydney harbor, 3 m. n.n.w. of North Sydney, and connected with that city by electric railway. The town owes its existence to the Nova Scotia Steel & Coal Company, whose mines are the oldest in Canada, coal having been mined there as early as 1785. A large steel plant is also located there, and these two industries employ 2,500 persons. The town government consists of a mayor, elected yearly, and a council of eight members elected every two years. The population is mainly Scotch, Irish, and English. Pop. (1905) 5,000.

SYD'NEY, ALGERNON. See SIDNEY.

SYE'NE. See ASSOUAN.

SYENITE, n. *sī'ĕ-nīt* [from *Syene*, in Upper Egypt, where found]: granite rock composed of quartz, felspar, and hornblende—differing from true granite in having the mica replaced by hornblende (see GRANITE). The 'Quincy granite' is a good example. The felspar is generally red (sometimes white), and the hornblende gives a mottled red and dark green color to the rock. The name Syenite was formerly given also to any granite rock in which hornblende predominates. SY'ENITIC, a. *-ĕ-nĭt-ĭk*; containing or resembling syenite.

SYEPOORITE, n. *sī'ĕ-pôr'īt:* a sulphide of cobalt, of a steel-gray color, found at *Saipoor*, in India—used by Indian jewelers to give a rose-color to gold.

SYKES, *sīks*, GEORGE: 1822, Oct. 9—1880, Feb. 9; b. Dover, Del.: military officer. He graduated at the U. S. Military Academy, and was appointed brevet 2d lieutenant 3d infantry 1842; was promoted 1st lieutenant 1846; captain 1855; major and brigadier-general of volunteers 1861; brevet colonel U. S. A. and major-general volunteers 1862; brevet brigadier-general and major-general U. S. A. 1865; and colonel 20th infantry 1868. He served through the Mexican war; on frontier and Indian duty; commanded the regulars in the first Bull Run and in the defense of Washington, and the 5th corps at Gettysburg, and till 1864, Apr.; and from 1877 till his death was in command at Fort Brown, Texas.

SYKES, OLIVE (LOGAN): actress and author: b. Elmira, N. Y., 1841, Apr. 16; sister of Eliza and Celia Logan. She made her first appearance in Philadelphia 1854; but soon went to England for study. In 1864 she reappeared in New York in a play of her own writing, *Eveleen*, but retired permanently from the stage 1868. She has since lectured on various subjects, written for newspapers and magazines, and published several books. In 1890 she was elected a member of the Incorporated Society of Authors, of London. She married, 1892, James O'Neill Logan.

SYL-, prefix, *sĭl:* the form taken by the Greek prefix *sun*, with, before words beginning with the letter *l*.

SYLLABARIUM, n. *sĭl'lă-bā'rĭ-ŭm*, SYL'LABA'RIA, n. plu. *-rĭ-ă* [mid. L.—from L. *syl'laba;* Gr. *sul'labē*, a syllable (see SYLLABLE)]: a catalogue of the primitive syllables of a language. SYL'LABARY, n. *-bĕr-ĭ*, the syllabic symbols of certain languages; a table of syllables; a syllabarium.

SYLLABLE, n. *sĭl'lă-bl* [L. *syl'laba;* Gr. *sul'labē*, a syllable—from Gr. *sun*, together; *lambanō*, I take]: as much of a word as can be uttered distinctly by one effort of the voice; a word; anything proverbially concise; a particle: V. to pronounce articulately; to utter. SYL'LABLING, imp. SYL'LABLED, pp. *-lă-bld*. SYLLABIC, a. *sĭl-lăb'ĭk*, or SYLLAB'ICAL, a. *-ĭ-kăl*, pertaining to or consisting of a syllable. SYLLAB'ICALLY, ad. *-lĭ*. SYLLAB'ICATE, v. *-kāt*, to form into syllables. SYLLAB'ICATING, imp. SYLLAB'ICATED, pp. SYLLAB'ICA'TION, n. *-kā'shŭn*, the act of forming into syllables, or dividing words into syllables; also SYLLAB'IFICA'TION, n. *-fĭ-kā'shŭn* [L. *facĭō*, I make].

SYLLABUB, n. *sĭl'lă-bŭb*. See SILLABUB.

SYLLABUS, n. *sĭl'lă-bŭs* [mid. L. *syllăbus*, a list (see SYLLABLE)]: an abstract; table of contents; compendium containing the heads of a discourse. *The Syllabus*, in *Rom. Cath. Church*, document published by authority of Pope Pius IX. 1864, Dec. 8 (full title, *Syllabus Propositionum ab Apostolica Sede Damnatarum*); comprising 80 propositions on matters of faith, morals, civil policy, etc., which had been condemned during the pontificate of Gregory XVI. and by Pius himself. The Syllabus was accompanied by the bull *Quanta Cura*, and soon afterward the Syllabus and the bull were published in a volume with the several bulls, letters apostolic, allocutions, etc., in full, wherein the several propositions were originally censured (New York and Ratisbon: F. Pustet). In France the government prohibited publication of the Syllabus and of the bull: the documents were denounced by the liberals as 'subversive of social order.' Two bishops were prosecuted for reading the Syllabus and bull from the pulpit. William E. Gladstone (1874) issued a pamphlet (*The Vatican Decrees*) in which he animadverted on the teaching of the bull and Syllabus with regard to liberty of the press, of speech, of conscience, etc. As regards the doctrinal authority of the Syllabus, theologians are not agreed whether its condemnations are *ex cathedra* teachings or not.

SYLLEPSIS, n. *sĭl-lĕp'sĭs* [Gr. *sullēpsis*, a taking together—from *sun*, together; *lambanō*, I take]: in *gram.*, a figure by which we accept the sense of words rather by the intention of the author than by their strict grammatical import; the agreement of a verb or adjective with one rather than another of two nouns, with either

of which it might agree. SYLLEP'TIC, a. *-tĭk*, or SYLLEP'TICAL, a. *-tĭk-ăl*, of or pertaining to.

SYLLOGISM, n. *sĭl'lō-jĭzm* [L. *syllŏgis'mus;* Gr. *sullŏgis'mos*—from *sun*, together; *logiz'ōmai*, I reckon—from *logos*, a word, reasoning]: form of argument consisting of three terms or propositions, the first two called the premises, the third the conclusion; and these propositions are such that if the premises be allowed as true, the conclusion also must be allowed as true (see below). SYL'LOGIZE, v. *-jīz*, to reason by syllogisms. SYL'LOGIZING, imp. SYL'LOGIZED, pp. *-jīzd*. SYL'LOGIZER, n. *-jī-zẹr*, one who reasons by syllogisms. SYL'LOGIS'TIC, a. *-jĭs'tĭk*, or SYL'LOGIS'TICAL, a. *-tĭ-kăl*, pertaining to or in the form of a syllogism. SYL'LOGIS'TICALLY, ad. *-lĭ*.—*Syllogism* is a term expressing a principal branch or department of Logic. When we reason or arrive at truth by means of inference, we are said to proceed either inductively (see INDUCTION) or deductively (see DEDUCTION). Deductive reasoning, fully and methodically expressed, takes the form called syllogism. 'This thing will sink in water, for it is a stone,' is a deductive argument, but not fully stated; the complete form is: 'Stones sink in water; this is a stone: therefore, this will sink in water'—which form is a syllogism. See LOGIC.

To a perfect syllogism it is necessary that there should be three, and no more than three *Propositions* (see PROPOSITIONS); these are the conclusion, or the matter to be proved, and two others that are the means of proving it, called the premises. It is necessary also that there should be three, and no more than three, *terms*, viz., the subject and the predicate of the conclusion, and one, called the middle term, which must occur in both premises, being the connecting link for bringing the two other terms together in the conclusion.—The *predicate* of the conclusion is called the major term, because it is in its scope the largest of the three; the *subject* of the conclusion is the minor term, as being the smallest in scope. The three terms enter into the premises in this manner: the major term and middle term make one premise, called the major premise; the middle term and the minor term make the minor premise. In the syllogism above the terms are, 'a thing that will sink in water' (major), 'this thing' (minor), 'stone' (middle); the premises are, 'stones sink in water' (major), 'this thing is a stone' (minor); the conclusion is, 'this thing will sink in water.'

The form thus given, though the regular and fundamental form to prove any affirmative conclusion, is not the only form that an argument may assume. The totality of syllogistic forms is divided into *figures*, and each figure into *moods*, which are the distinct syllogistic forms, the principle of division being as follows. The figure is determined by the position of the middle term; which may be the *subject* of the major premise, and the *predicate* of the minor (1st figure), the *predicate* in both

(2d figure), the *subject* in both (3d figure), the *predicate* of the major and the *subject* of the minor (4th figure).

The word 'figure' is borrowed from rhetoric, where it means a departure from plain and ordinary speaking, as metaphor, hyperbole, etc.

The first has been called the perfect figure. In so far forth as an inference assumes a demonstrative form, based on insight into the grounds of the conclusion, it the more readily takes the form of the 1st figure. One may regard the 3d, 2d, and 1st figures as representing successive stages in the development of inference from guesswork to completely reasoned inference. Only the 1st figure gives conclusions in all four forms of proposition, A, E, I and O. The 3d figure represents inferences based simply upon the citation of several instances or cases, e.g., 'Some animals are quadrupeds, all mammals are vertebrates, therefore some vertebrates are quadrupeds.' The 2d figure gives universal conclusions in negative form, i.e., enables us to exclude the major from all participation in the minor, as, for example, 'No fish are vertebrates, all mammals are vertebrates, therefore no mammals are fish.' In the 1st figure the particular may be exhibited in the full light of the universal, i.e., the middle term may give the *reason why* of the relation, e.g., 'All organisms are, by their very nature, mortal. Man is an organism, therefore man is mortal.' The goal of reasoning is this insight, through concepts or universals, into the nature and relations of particular facts.

The 4th figure did not belong to the original scheme of Aristotle, and it is usually considered as both unnatural and unnecessary, being only an awkward inversion of the first.

The syllogisms of each figure are said to differ in *mood*, or according to the *quality* and the *quantity* of the propositions—that is, according as these are affirmative or negative (quality), universal or particular (quantity). (See MOOD.) If the conclusion be taken into account, sixty-four moods are numerically possible; but, since the conclusion depends on the premises, *logically* only sixteen moods need be considered, for there are only sixteen possible permutations of A, E, I, O, taken in pairs as premises. The determination of the valid moods in each figure is made by the application of the following rules: 1. The middle term must be distributed at least once, i.e. taken as universal, not as particular. 2. If a term be distributed in the conclusion, it must have been distributed in the premises. 3. Two particular premises yield no conclusion. 4. Two negative premises yield no conclusion. 5. If one premise be negative, the conclusion must be negative. 6. If one premise be particular, the conclusion must be particular. The application of these fundamental rules to the different figures yield the special rules or Canons of the four figures. Only eight valid

moods are possible without reference to the figure, and, when the figure is taken into account, the number is still further reduced.

The entire scheme may be presented as follows: The symbols used are P (predicate of conclusion), major term; S (subject of conclusion), minor term; M, middle term. A, E, I, O, the four types of proposition.

The general type of the first figure or standard is:

M is P.
S is M.
S is P.

When the quality and the quantity of the propositions are expressed, there arise four syllogisms of this form—two affirmative, and two negative:

All M are P.	A.
All (or some) S are M.	A or I.
All (or some) S are P.	A or I.

All matter gravitates.	A.
All (or some) air is matter.	A or I.
All (or some) air gravitates.	A or I.

No M is P.	E.
All (or some) S is M.	A or I.
No S is P; some S is not P.	E or O.

No matter is destructible.	E.
All (or some) air is matter.	A or I.
No air is destructible; some air is not destructible.	E or O.

The general scheme of the *2d figure* is:

P is M.
S is M.
S is P.

There are four syllogisms in all, which we may take in pairs thus:

No P is M.	E.
All (or some) S are M.	A or I.
No S is P; some S are not P.	E or O.

'No destructible thing is matter,' etc., as in the last form.

All P is M.	A.
No S is M; some S is not M.	E or O.
No S is P; some S is not P.	E or O.

All matter is extended.	A.
No mind is extended.	E.
No mind is matter.	E.

The last form, with a particular conclusion, is exemplified thus:

All matter is extended.	A.
Some things are not extended.	O.
Some things are not matter.	O.

This figure proves only negatives.

The scheme of premises in the *3d figure* is:

M. P.
M. S.

Six varieties of syllogism come under this figure; we may arrange them in three pairs, the first two pairs having the same major, and the third the same minor:

All M is P.	A.
All (or some) M is S.	A or I.
Some S is P.	I.
All planets move.	A.
All (or some) planets are heavenly bodies.	A or I.
Some heavenly bodies move.	I.
No M is P.	E.
All (or some) M is S.	A or I.
Some S is not P.	O.
No solid body is perfectly transparent.	E.
All solid bodies gravitate.	A or I.
Some gravitating things are not perfectly transparent.	O.
Some M is P; some M is not P.	I or O.
All M is S.	A.
Some S is P; some S is not P.	I or O.

This figure proves only particular propositions.

In the *4th figure,*

P is M,
M is S,

there are five syllogisms. The mere forms are enough to quote.

All P are M.	A.
All M are S.	A.
Some S are P.	I.
All P are M.	A.
No M is S.	E.
No S is P.	E.
Some P are M.	I.
All M are S.	A.
Some S are P.	I.
No P is M.	E.
All M are S.	A.
Some S are not P.	O.
No P is M.	E.
Some M are S.	I.
Some S are not P.	O.

Mr. Mill has laid down the following fundamental axioms of the syllogism, as stated in its standard forms in the 1st figure. (1) 'Attributes coinciding with the same attribute coincide with one another.' M, the middle term, coincides with P, the predicate; S, the subject,

coincides with M; therefore S and P coincide with one another. (2) 'Any attribute incompatible with a second attribute, is incompatible with whatever that second attribute coincides with.' No M is P; M is incompatible with P; but S coincides with M, and therefore it also is incompatible with P. Aristotle formulated the fundamental canon of all reasoning, in what is known as the *Dictum de omni et nullo,* which is commonly stated as follows:—whatever is predicated affirmatively or negatively of a whole class must be predicated affirmatively or negatively of everything contained under that class. A simpler and better formulation of the principle of syllogistic inference is this: 'What qualifies an attribute of anything qualifies the thing possessing the attribute.' This formula calls attention to the fact that reasoning has to do with universal *meaning* or *attributes,* not simply with numerical classes of things.

All the syllogisms of the last three figures are reducible to the first, by conversion of propositions and transposition of premises, according to the nature of the case. The symbolic name of each syllogism contains instruction for this process, as well as stating the composition of the syllogism. To aid the memory, these symbols are put together in five Latin hexameter verses of very ancient but unknown origin:

'*Barbara, Celarent, Darii, Ferioque prioris.*
Cesare, Camestres, Festino, Baroko, secundæ.
Tertia Darapti, Disamis, Datisi, Felapton,
Bokardo, Ferison habet, quarta insuper addit
Bramantip, Camenes, Dimaris, Fesapo, Fresison.'

The first line gives the standard figure, and states the propositions entering into each syllogism. The three A's in Barbara are three universal propositions. The E, A, E, in Celarent, are a universal negative, a universal affirmative, a universal negative; in Darii, A, I, I, a universal affirmative and two particular affirmatives, etc. In the other figures the commencing letter (C, B, etc.) shows which standard syllogism each is to be reduced to (Baroko to Barbara, Cesare to Celarent, etc). The consonant *s* means simple conversion of the proposition marked by the preceding vowel; *p* means conversion by limitation, or *per accidens* (see CONVERSION IN LOGIC); *m* signifies the transposition of the premises; *k* occurs in Baroko and Bokardo, and denotes that these are to be reduced by supposing the conclusion false, and then showing that on that supposition Barbara would be contradicted—from which it is inferred that the original form is true.

Reduction is a species of intellectual gymnastics utterly without practical value, since syllogistic inference in every figure can be directly tested by application of the general rules for distribution. The chief value of the mnemonic verses cited is as a historical illustration of mediæval scholastic logic.

There are some species of deductive arguments that do not fall under the syllogistic figures. Thus, the major may state a conditional proposition, and the minor affirm the truth of the condition: 'If the witness is to be believed, the man is guilty' (major); now 'the witness is to be believed' (minor); therefore 'the man is guilty.' A true conclusion would also be obtained by a minor denying the consequent, 'the man is not guilty.' It would then follow that the witness (who affirms his guilt) is not to be believed. But no conclusion would follow from either denying the condition, 'the witness is not to be believed,' or affirming the consequent, 'the man is guilty;' for, in the first place, the man might be guilty whether this particular witness be credible or not; and secondly, the guilt of the man does not prove the credibility of the witness. Complete reciprocity in the conditions obtains only where the relationship is a necessary one, as in mathematical, or other exact, sciences. This is called the *Hypothetical* or *Conditional* Syllogism. (See ANTECEDENT and CONSEQUENT.)

Again, the major may be what is called a Disjunctive or Alternative Proposition, from which also inferences may be drawn by supplying certain minors: 'This was done by either A or B;' now 'it was not done by A (or by B);' therefore 'it was done by B (or by A).' Should the major be understood to mean that it was done by one, and not by both, there would be two other possible inferences: 'It was done by A (or by B);' therefore 'it was not done by B (or by A).' There are other disjunctive pairs—e.g., 'Either A is B, or C is D;' now 'A is not B, therefore C is D,' etc. This is called the *Disjunctive* Syllogism.

The value of Disjunctive Inference depends upon the exhaustiveness of the disjunction. This really presupposes a very complete knowledge of any subject of inference. A combination of the Hypothetical and the Disjunctive makes the *Dilemma*. For example:

If A is B, E is F; or if C is D, E is F.
But either A is B or C is D.
Therefore, in any case, E is F.

'If a man act in accordance with his own opinions, he will be criticised; and if a man act in accordance with the opinions of others he will be criticised. But a man must act either in accordance with his own opinions or with those of others. Therefore, in any case, a man will be criticised.' The Dilemma is a very unsafe form of argument, since its force depends upon both the necessity of the relation in the Hypothetical, and the completeness of the Disjunctive (see DILEMMA). There are certain types of deductive inference that have three terms but do not fall within the traditional syllogistic forms. These depend on the truth of certain *systems of relations*, such as relations in Space, Time, Magnitude, Human Society. Examples are: 'A is to the right of B, B is to the right

of C, therefore A is still further to the right of C'; 'A happened before B, B happened before C, therefore A happened still longer before C'; 'A is B's son, B is C's son, therefore A is C's grandson.'

An extension has been given to the doctrine of the syllogism by Sir W. Hamilton, DeMorgan, Boole, Pierce, and others (see LOGIC, SYMBOLIC). They have shown that many more syllogistic pairs can be created, and have invented symbols for the purpose. It is, however, comparatively few, either of the old pairs or of the new, that are assumed by the ordinarily occurring arguments, either in the sciences or in common affairs. See also CHAIN; CLASS; CONVERSION; DENOTATION.

SYLLOGOS, *sĭl'lo-gŏs*, THE GREEK LITERARY, of Constantinople: the most learned Greek society existing, founded 1862. Its objects are, encouragement of learned research in all departments, and the moral, social, and intellectual elevation of the Greek race. In 1886 it numbered 800 regular, 100 corresponding, and 125 honorary members, including many of the most eminent scholars of Europe. It has aided or inspired the formation of 100 kindred societies in the Turkish empire and Greece, assisted in establishing schools and providing teachers, and contributed largely to archæological and other knowledge. Its publications are elaborate; one has 161 facsimiles of inscriptions previously unpublished.

SYLPH, n. *sĭlf* [F. *sylphe*, genius of the air—from Gr. *silphē*, a kind of beetle or moth]: imaginary being inhabiting the air; a fairy. SYLPH-LIKE, a. like a spirit. SYLPH'ID, n. *-ĭd*, a little sylph. SYLPH'INE, a. *-īn*, like a sylph.—SYN. of 'sylph': fairy; nymph; elf; peri; fay.—*Sylphs*, in the fantastic system of the Paracelsists, are the elemental spirits of the air, who, like the other Elemental Spirits (q.v.), hold an intermediate place between immaterial and material beings. They eat, drink, speak, move about, beget children, and are subject to infirmities like men; but, on the other hand, they resemble spirits in being more nimble and swift in their motions, while their bodies are more diaphanous than those of the human race. They surpass the latter also in knowledge, both of the present and the future, but have no soul [spirit]; and when they die, nothing is left. In form they are ruder, taller, and stronger than men; but stand nearest to them of all the elemental spirits, by reason of which they occasionally hold intercourse with human creatures, being fond especially of children and of simple harmless people; they even marry with the human race, like the Undines and the Gnomes; and the children of such a union have souls, and belong to the human race.

Sylph, in common usage, has a feminine signification, and is applied to a graceful and (in a poetic sense) ethereal maiden. How this curious change of meaning occurred is not certain; but it is probably traceable to the popularity of Pope's *Rape of the Lock*, which intro-

duced the term into the world of fashion and literature. For though even in Pope the sylph that guards Belinda is a *he*, yet the poet so refined and etherealized his spiritual agents that they soon came to be associated with all our ideas of feminine grace and beauty; and this may have reacted on the popular idea—always loose and inaccurate—of their character and sex, and brought about the change of gender in popular usage. See Paracelsus's *Liber de Nymphis, Sylphis, Pygmæis et Salamandris et Cæteris Spiritibus* (Basel ed. of Paracelsus's works, 1590).

SYLT, *sĭlt:* largest island of Germany, in the North Sea; part of the province of Schleswig-Holstein, and 7-12 m. from its coast; nearly 23 m. long and half a mile to 7 m. wide. It has some marsh and moor land, but is chiefly a mass of sand-dunes, about 150 ft. high; and contains the villages Keitum, Westerland, and Morsum. The island has some interesting pagan tombs. Pop. about 3,000.

SYLVA, *sĭl'va,* CARMEN: pseudonym of PAULINE ELIZABETH OTTILIE LOUISE, Queen of Rumania: b. 1843, Dec. 28: daughter of Prince Herman of Weid. She devoted much attention to the improvement of Rumanian educational facilities and the development of Rumanian industries, and after 1880 she published several volumes of poetry, among them *Leidens Erdengang* (1882; in an English version, *Pilgrim Sorrow,* by Zimmern); *Jehovah* (1882); *Pensées d'une Reine* (1882); *Persch Märchen* (1883); *Handwerkerlieder* (1891); *A Real Queen's Fairy Book* (1902); and many poems, novelettes, etc. The folk-lore and customs of Rumania form the predominant subjects.

SYLVAN, a. *sĭl'văn,* also spelled SIL'VAN [L. *silva,* a wood, a forest]: pertaining to a wood or grove; inhabiting woods; woody; shady: N. a wood god; a satyr. SYLVIC ACID, a crystalline body obtained from resin, isomeric with pinic acid. SYL'VA, n. *-vă,* the forest-trees of any country. SYL'VAS, n. *-sĭl-văz,* the woodland region of the plain of South America; also SELVAS.

SYLVANITE, n. *sĭl'văn-īt:* a name originally given to native tellurium, from its being first found in *Transylvania;* a valuable ore of gold and silver, of a steel-gray or brass-yellow color.

SYLVESTER, *sĭl-vĕs'tĕr* (or SILVES'TER), I., Pope of Rome: d. 335 (pope 314-335). His pontificate immediately succeeded that of Melchiades, and is memorable for the great council of Nicæa, in which the heresy of Arius was condemned. Sylvester did not attend the council, but sent two priests—Vitus and Vincentius—as representatives. The story of his baptism of Emperor Constantine is a fiction; and the ancient document *Donation of Constantine,* connected with Sylvester's name, has long been known as spurious, though dating probably not more than two centuries later than Sylvester.

SYLVES'TER (or SILVESTER) II. (originally called GERBERT), Pope of Rome: b. Aurillac, in Auvergne, early in the 10th c.; d. 1003, May 12 (pope 999-1003). He was educated in the monastery of his native village; but went early to Spain, where he learned mathematics; and afterward to Rome. He was appointed abbot of the great monastery of Bobbio, where he taught with much distinction and success. At a later period he went to Germany as preceptor of young Prince Otho, afterward Otho II.; and ultimately became secretary to the archbishop of Rheims, and director of the cathedral school, which became eminent under his care. The archbishop having been deposed, Sylvester was elected to the archbishopric; but he was afterward set aside, the deposition of his predecessor having been declared invalid. In 998, however, he was appointed archbishop of Ravenna, whence he was called to the pontifical throne, 999, under the name Sylvester II. He was a man of rare acquirements for his age—the most learned of the mediæval popes. He was an adept in mathematics, and in practical mechanics and astronomy, in which department his attainments acquired for him among his contemporaries the evil reputation of a magician. He is believed also to have been acquainted with Greek, and perhaps with Arabic. Sylvester was the most distinguished statesman of his age. Of his many works, his letters (printed by Du Chesne in *Historian of France*) have attracted most notice from their bearing on the history of an obscure period, and on the historical discussion as to the ecclesiastical relations of the Roman see and as to the papal infallibility.

SYLVES'TER, JAMES JOSEPH, LL.D., D.C.L.: mathematician: b. London, 1814, Sept. 3; d. 1897, Mar. 15. He was educated at the Royal Institution, Liverpool, and at St. John's College, Cambridge; became professor of natural philosophy at University College, London; was professor of mathematics at the University of Virginia 1841-2; was appointed to a similar chair at the Royal Military Academy, Woolwich, 1855; held a similar professorship at Johns Hopkins University, Baltimore, 1876-83, and was elected Savilian professor of geometry at Oxford University 1883, Dec. He founded and was the first editor of *The American Journal of Mathematics;* studied law and was called to the bar; published several hundred scientific memoirs in the *Transactions* of the Royal Society, and in English, French, Belgian, and Italian periodicals; published *Laws of Verse* (London, 1870); made public his theory of reciprocants, in connection with algebra, 1885; and issued a universal funicular solution of Buffon's *Problem of the Needle* 1890, June.

SYLVES'TER, JOSHUA: English poet: 1563-1618; d. in Holland, after a wandering life. His English version of the *Divine Weeks and Works* of Du Bartas obtained a fleeting popularity; and solely because from it Milton is thought to have derived some hints. Sylvester lives in literary history as a sort of *nominis umbra.*

SYLVIIDÆ, *sĭl-vī'ĭ-dē:* family of birds, the old-world warblers, of order *Insessores,* including a great number of small species, among which are many of the birds most noted for sweetness of song, while something of this power is possessed by almost all the family, so that the name *Warblers* is often used as synonymous with Sylviidæ. The bill is sharp, slender, and rather compressed toward the tip; wings are moderately long; legs slender. To this family belong, in some classifications, the Nightingale, the Blackcap, numerous species known by the name Warbler—the Redbreast, Redstart, Wheatear, Whitethroat, Stonechat, Whinchat, Golden-crested Wren, Hedge-sparrow, etc.—The American warblers are set apart under the family SYLVICOLIDÆ (with a subfamily *Sylvicolinæ,* including the typical wood-warblers), and differ from the *Sylviidæ* in many details, such as bill not decurved nor distinctly notched, the wings with 9 primaries, etc. There are more than a hundred species, of many genera. Another name of the family is *Mniotiltidæ.* See WARBLER.

SYM-, *sĭm* [Gr. *sun*]: a Greek prefix, another form of SYN, which see.

SYMBIOSIS, n. *sĭm-bĭ-ō'sĭs* [Gr. *sumbiōsis,* living with companionship, connection—Gr. *sun,* with; *bios,* life]: in *biol.,* the united life of certain organisms. Some orchids and fungus hyphæ thus obtain nourishment in common.

SYMBOL, n. *sĭm'bŏl* [L. *symbŏlum;* Gr. *sumbŏlŏn,* a sign or mark—from *sun,* together; *ballō,* I throw—*lit.,* the act of several in throwing together portions to form a whole]: sign or mark by which one knows or infers a thing; some outward token by which something moral or spiritual is represented or suggested to the mind; a creed (see CREEDS AND CONFESSIONS; SYMBOLICAL BOOKS); an emblem; a type; a letter or character having a distinctive signification; a religious rite or outward form representing something else; in *OE.,* contribution to a general fund; sentence of adjudication: V. to express by symbols. SYMBOLIC, a. *sĭm-bŏl'ĭk,* or SYMBOL'ICAL, a. *-ĭ-kăl,* expressed or represented by resemblances or signs; figurative; representative; typical. SYMBOL'ICALLY, ad. *-lĭ.* SYMBOL'ICS, n. plu. *-ĭks,* the study of symbols of old religions or Christian creeds. SYMBOLIZE, v. *sĭm'bŏl-īz,* to express by symbols; to have a resemblance of qualities or properties; to be typical of. SYM'BOLIZING, imp.: ADJ. representing symbolically. SYM'BOLIZED, pp. *-īzd.* SYM'BOLIZA'TION, n. *-ĭ-zā'shŭn,* act of symbolizing; resemblance in properties or qualities. SYM'BOLIZER, n. one who symbolizes. SYM'BOLISM, n. *-ĭzm,* use of, or the being represented by, symbols; among *chemists,* consent of parts or ingredients. SYMBOLOGY, n. *sĭm-bŏl'ŏ-jĭ,* art of expressing by symbols. SYMBOLICAL BOOKS—in the sense either of *symbol* as a distinctive mark, or of *symbol* as a contribution or putting together—Christian creeds and confessions, authoritative statements of doctrines held by the church general or by divisions of the church.

SYME, *sīm*, JAMES: Scottish surgeon: 1799, Nov. 7—1870, June 26; b. Edinburgh. He received a thorough education in art and medicine, in the University of Edinburgh. In his 19th year he began anatomical studies under Liston, who appointed him his demonstrator. 1825-32 he lectured on surgery in the Edinburgh School; and established a hospital at his own expense, where he delivered a clinical course for four years. In 1831 appeared his well-known treatise on *The Excision of Diseased Joints;* and 1832 his *Principles of Surgery* (many editions since), which established his reputation as a teacher of the first rank. In 1833 he was elected to the chair of surgery in the University of Edinburgh, which he filled with distinction. In 1847 he resigned his Edinburgh chair to fill that vacated in London by the death of Liston; but collegiate misunderstandings induced him, after six months, to return to Edinburgh. His unconciliatory manner in advancing his just views seems to have occasioned frequent disagreements with his colaborers. As an operator, Syme had no superior; as a teacher, few equals. His innovations in surgical practice were characterized by so much ingenuity, controlled by scientific caution, that they were adopted by nearly all great surgeons. His pupils were numerous, and in every quarter of the globe. Besides works above named, he was author of valuable treatises on Diseases of the Rectum; on the Pathology and Practice of Surgery; on the Urethra, etc. See the *Memoir* by Dr. Paterson (1874).

SYMINGTON, WILLIAM: British engineer and inventor: b. Leadhills, Scotland, 1763; d. London, 1831, Mar. 22. He was educated at the universities of Edinburgh and Glasgow, studying for the ministry, but abandoned that profession to become a civil engineer. In 1787 he took out a patent for an improved form of steam-engine, and in 1802, after years of futile attempts, he succeeded in propelling the tugboat *Charlotte Dundas* by means of steam-engines with which he had fitted her. He gained the patronage of the Duke of Bridgewater, but the death of the duke in 1803 left him without the financial aid necessary to the promotion of his venture, and being unable to gain it elsewhere, he drifted from place to place, finally dying in poverty.

SYMMACHIANS, n. *sĭm-mā'kĭ-anz:* name sometimes given to the Nazarenes or Nazareans. See EBIONITE.

SYMMACHUS, QUINTUS AURELIUS: Roman statesman of the 4th c. He was educated in Gaul; and after serving as quæstor and prætor became Corrector of Lucania and the Brutii (365) and proconsul of Africa (373), and member of the pontifical college. His petition to Gratian, urged on the senate's behalf, for the restoration of the altar of Victory, proved unavailing (382), as did the extant letter addressed by him when præfect of the city (384) to Valentinian. The failure led him to side with the pretender Maximus (387), and for so doing he was

impeached of treason, but pardoned and raised to the consulship (391).

SYMMES, *sĭmz*, JOHN CLEVES: 1742, July 21—1814, Feb. 26; b. Long Island: jurist. He represented Delaware in the continental congress 1785-6; was judge and chief-justice of the supreme court of New Jersey; was appointed judge of the Northwest Territory 1787; obtained from the federal government a grant of 1,000,000 acres of land in the Ohio and Miami valleys 1788; and was the founder of North Bend and Cincinnati.—His nephew, JOHN CLEVES SYMMES (1780-1829, May 28; b. New Jersey), entered the U. S. army 1862, served as captain in the war 1812-15, and afterward applied himself to philosophical pursuits at Newport, Ky. In 1818 he made public his theory that the earth is a hollow sphere, habitable within, open at the poles, and containing several concentric hollow spheres similarly open. He lectured widely on the theory, and petitioned congress vainly to fit out an expedition to prove it.

SYMMETRY: from Gr. σύν, with, and μέτρον, measure. The element of beauty in nature or art which measure. The element of beauty in nature or art which results from balance of parts in a whole. Though universally recognized, the principle has been most emphasized in Greek art. It was first applied to numbers, then to parts of a statute, and finally to the relations of form in general. It is applied most rigidly to sculpture and architecture, loosely to drawing and painting, and somewhat metaphorically to cannon and fugue in music, to metric relations in poetry, and to the structure of the drama. SYMMETRICAL, a. *sĭm-mĕt'rĭ-kăl*, proportional in all its parts; having corresponding parts or relations. SYMMET'RICALLY, ad. *-lĭ*. SYMMETRIZE, v. *sĭm'mĕt-rīz*, to make proportional in all its parts; to cause to have corresponding parts. SYM'METRIZING, imp. SYM'METRIZED, pp. *-rīzd*. SYM'METRIST, n. *-rĭst*, one who is studious of symmetry.

SYM'METRY, BILATERAL: in the animal and vegetable kingdoms, proportion more or less observable in the distribution of organs to the two sides. Throughout the animal kingdom, there is general symmetry in the two sides of the body. This is the case in man and in all the *Vertebrata;* but more in the external than the internal organs, the two sides of the body presenting great diversities in the circulating, digestive, and other systems. Even the external organs, though similar on the two sides, are never perfectly alike. Thus, on comparing the two hands, the veins of one are seen to differ from those of the other. In *Mollusca,* the symmetry of the two sides sometimes exists, and sometimes is entirely lost, one side remaining undeveloped in the growth of the animal. In *Articulata,* the symmetry is in general as perfect as in *Vertebrata,* and in the internal structure more so. In *Radiata,* the whole type is very different,

and a very different kind of symmetry appears, with reference not to two sides, but to the rays into which the body divides.

In the vegetable kingdom, symmetry prevails more or less, but never completely, between the two sides of leaves, fronds, etc. In flowers, a symmetry appears in the regular distribution of sepals, petals, stamens, etc., around the centre of the flower; and even those flowers which least exhibit it when fully blown, e.g., papilionaceous flowers, possess it in the early stages of the bud as perfectly as others.

SYMONDS, JOHN ADDINGTON: English author and critic: b. Bristol 1840, Oct. 5; d. Rome 1893, Apr. 19. Graduated from Balliol College, Oxford, in 1860, he was elected fellow of Magdalen in 1862, undertook but abandoned legal studies, and entered literature as a profession. For many years he was compelled by ill-health to reside at Davos-Platz, canton of the Grisons, Switzerland. His studies were largely concerned with the Renaissance and the representative personages of that period. His chief work is the *Renaissance in Italy* (1875-86), a historical narrative with mingled criticism. Its scholarship is very accurate and comprehensive, and its insight into the spirit of the time and movement is notably acute. If it fail in well-roundedness and system some excuse may be found in the complexity of the subject and some reparation in the brilliancy of individual passages. Other volumes in this general field are: *An Introduction to the Study of Dante* (1872); *Shakespere's Predecessors in the English Drama* (1884), an excellent contribution to the history of English literature; lives of Sidney (1887) and Jonson (1887) in the *English Men of Letters* series; of Michelangelo (1893) and Boccaccio (1895); and English renderings of the *Sonnets of Michelangelo and Campanella* (1878) and the *Autobiography of Benvenuto Cellini* (1888). Others of Symonds' works are: *Studies of the Greek Poets* (1873-6), designed for the popular reader and approaching Hellenic literature through the individuality of the authors; *Sketches in Italy and Greece* (1874); *Sketches and Studies in Italy* (1879); *Essays, Speculative and Suggestive* (1890); *In the Key of Blue*, essays (1893); *Walt Whitman* (1893); and three books of verse, *Many Moods* (1878); *New and Old* (1880), and *Vagabunduli Libellas*, a collection of sonnets (1885). Symonds' critical work is marked by a finished style, and a distinctive note of liberal culture. Consult the *Life* prepared from correspondence by H. F. Brown (1895).

SYMONS, *sĭm'ŏnz*, ARTHUR: English poet and critic: b. Milford Haven, Wales, 1865, Feb. 28. He has written: *Introduction to the Study of Browning* (1886); *Days and Nights* (1888); *Silhouettes* (1892); *London Nights* (1895); *Studies in Two Literatures* (1897); *The Symbolist Movement in Literature* (1899); *Collected*

Poems (1901); *Mr. Pharisee's Wife* (1904), etc., and has edited the essays of Leigh Hunt, the plays of Shakespeare, etc.

SYMPATHY, n. *sĭm'pă-thĭ* [F. *sympathie*—from Gr. *sumpăthei'a*, conformity of feeling—from *sun*, together; *pathos*, suffering]: feeling corresponding to that which another feels (see below): fellow-feeling; an agreement of affections, temperaments, or inclinations which makes two persons pleased with each other; compassion; in *med.*, that influence or correspondence which arises in one part of the body from disease or irritation in another part, as the headache of indigestion, the pain in the right shoulder in disease of the liver, or the affection of one eye from disease of the other (see below): propensity of inanimate bodies to unite, or to mutual action. SYM'PATHET'IC, a. *-thĕt-ĭk*, or SYM'PATHET'ICAL, a. *-ĭ-kăl*, pertaining to or acting by sympathy; susceptible of sympathy; having common feeling with one another; in *path.*, applied to the symptoms and affections which occur in parts more or less remote from the primary seat of disease. SYM'PATHET'ICALLY, ad. *-lĭ*. SYMPATHETIC INK (see INK). SYMPATHETIC NERVES, the system of nerves which are specially supplied to the viscera and blood-vessels. SYM'PATHIZE, v. *-thīz*, to have a common feeling with another; to be tender or compassionate. SYM'PATHIZING, imp.: ADJ. being affected by what another feels; tender; compassionate. SYM'PATHIZED, pp. *-thīzd*. SYM'PATHIZER, n. *-thī-zĕr*, one who feels with another.—SYN. of 'sympathy'; pity; compassion; mercy; commiseration; condolence; agreement; tenderness.

SYMPATHY, in Psychology and Philosophy: Sympathy has been regarded as a natural instinct, which appears after a certain degree of mental maturity is attained and is at times seemingly evinced by animals. It has also been regarded as a product of experience and not as in any true sense innate. Certainly sympathy is not one of the first of emotions to be manifested. Moreover, in mental disease it disappears before some of the more primitive emotions, like anger. The modern disposition is, however, to regard it as distinctly native in its roots. It may well be that while sympathy is in a crude form innate and instinctive, it nevertheless undergoes the same effects from experience which fall to the lot of other conscious phenomena. It thereby becomes modified and complicated.

In ethics sympathy has played an important rôle. For Adam Smith, as well as for Comte and Schopenhauer, sympathy is basal to morality. The great motivation to altruistic moral forms of action is to be found according to these men in the impulsive power of sympathy. Apart from its incitements we can find little motive for many of those sacrifices of personal happiness which human experience so often reveals. (See ETHICS.)

Even in æsthetics sympathy has played a part. The

doctrine of 'Einfüllung,' for which Lipps is chief sponsor, urges that all æsthetic feeling is in reality a modified form of sympathy with the æsthetic object. We 'feel ourselves' in such objects. (See ÆSTHETICS.)

SYMPHENOMENA, n. plu. *sĭm'fĕ-nŏm'ĕ-nă* [*sym*, and *phenomena*]: natural sounds or appearances of a kind or character similar to others expressed or exhibited by the same object. SYM'PHENOM'ENAL, a. *-ĕ-năl*, designating significant words imitative of natural sounds or phenomena.

SYMPHONY, n. *sĭm'fŏ-nĭ* [F. *symphonie*—from Gr. *sumphōnĭa*, harmony of sounds—from *sun*, together; *phōnē*, a sound, a tone]: consonance or harmony of mingled sounds: specially, a musical composition for a full band of instruments (see below): also the instrumental introduction or termination of vocal compositions; a ritornello. SYMPHONIC, a. *sĭm-fŏn'ĭk*, pert. to or characteristic of a symphony. SYMPHONIOUS, a. *sĭm-fō'nĭ-ŭs*, agreeing in sound; harmonious; symphonic. SYMPHONIZE, v. *sĭm'fō-nīz*, in *OE.*, to agree with; to be in unison. SYM'PHONIST, n. *-nĭst*, a composer of symphonies.—A *symphony*, as a composition for a full orchestra, consists of three to six movements. It is for the orchestra what a Sonata (q.v.) is for a single instrument; but generally of greater length, and its movements more fully and richly developed, the subjects introduced being worked out in broader masses. The most usual though not unvarying order of movements is a slow introduction, ushering in a brilliant allegro, followed by an adagio or andante, a minuet with its trio, a short sportive movement called a scherzo, and a lively finale.

SYMPHORICARPOUS, a. *sĭm'fŏr-ĭ-kâr'pŭs* [Gr. *sun*, together; *phorĕō*, I bear; *karpos*, fruit]: in *bot.*, bearing fruits clustered together.

SYMPHYSIS, n. *sĭm'fĭ-sĭs* [Gr. *sum'phŭsis*, a growing together—from *sun*, together; *phŭō*, I grow: F. *symphyse*]: in *anat.*, the union of bones by means of an intervening cartilage, so as to form an immovable joint; a healing by the first intention; the coalescence of a natural passage. SYM'PHYSEOT'OMY, n. *-sĕ-ŏt'ŏ-mĭ* [Gr. *tomē*, a cutting]: in *surg.*, the dividing the symphysis pubis during labor.

SYM'PHYTUM. See COMFREY.

SYMPIESOMETER, n. *sĭm'pĭ-ĕ-sŏm'ĕ-tĕr* [Gr. *sumpiĕzō*, I press together; *metron*, a measure]: a kind of barometer in which the pressure of the atmosphere, acting upon glycerine or oil, compresses an elastic gas in the upper part of the instrument, the change in the bulk of the gas being measured by a scale.

SYMPLOCE, n. *sĭm'plō-sē* [Gr. *sumplŏkē*, an interweaving—from *sun*, together; *plekō*, I twine]: in *gram.*,

the beginning and ending of successive clauses with the same word.

SYMPODIUM, n. *sĭm-pō'dĭ-ŭm* [Gr. *sun,* together; *pous,* a foot; *podes,* feet]: in *anat.,* a monster fetus having its feet grown together; in *bot.,* in forked branching, when the primary axis consists of the bases of consecutive bifurcations or branchings—also called PSEUDAXIS, n. *sū-dăks'ĭs* [Gr. *pseudēs,* false, and *axis*]: a false axis; cymose inflorescence. SYMPO'DIAL, a. *-dĭ-ăl,* of or pertaining to cymose inflorescence, or to axes branching in this manner.

SYMPOSIUM, n. *sĭm-pō'zĭ-ŭm,* SYMPO'SIA, n. plu. *-zĭ-ă* [L. *sympŏsĭum;* Gr. *sumpŏsĭŏn,* a drinking-party—from *sun,* together; *posis,* drink; *pinō,* I drink]: a drinking together; a merry feast.

SYMPTOM, n. *sĭm'tŭm* [Gr. *sumptōma,* a collapse, casualty, symptom—from *sun,* together; *ptōma,* a fall—from *piptein,* to fall: F. *symptome*]: something in concurrence with another thing; hence, a mark; a token; in *med.,* token, mark, or sign which indicates disease, and specifically the kind of disease (see SYMPTOMS). SYMPTOMATIC, a. *sĭm'tō-măt'ĭk,* or SYMP'TOMAT'ICAL, a. *-măt'ĭ-kăl,* indicating the existence of something else; happening in concurrence with something. SYMP'TOMAT'ICALLY, ad. *-kăl-lĭ.* SYMPTOMATIC DISEASE, a disease which is dependent upon, or which is a symptom of, some other disease, as dropsy following disease of the heart. —SYN. of 'symptom': indication; token; mark; sign; note.

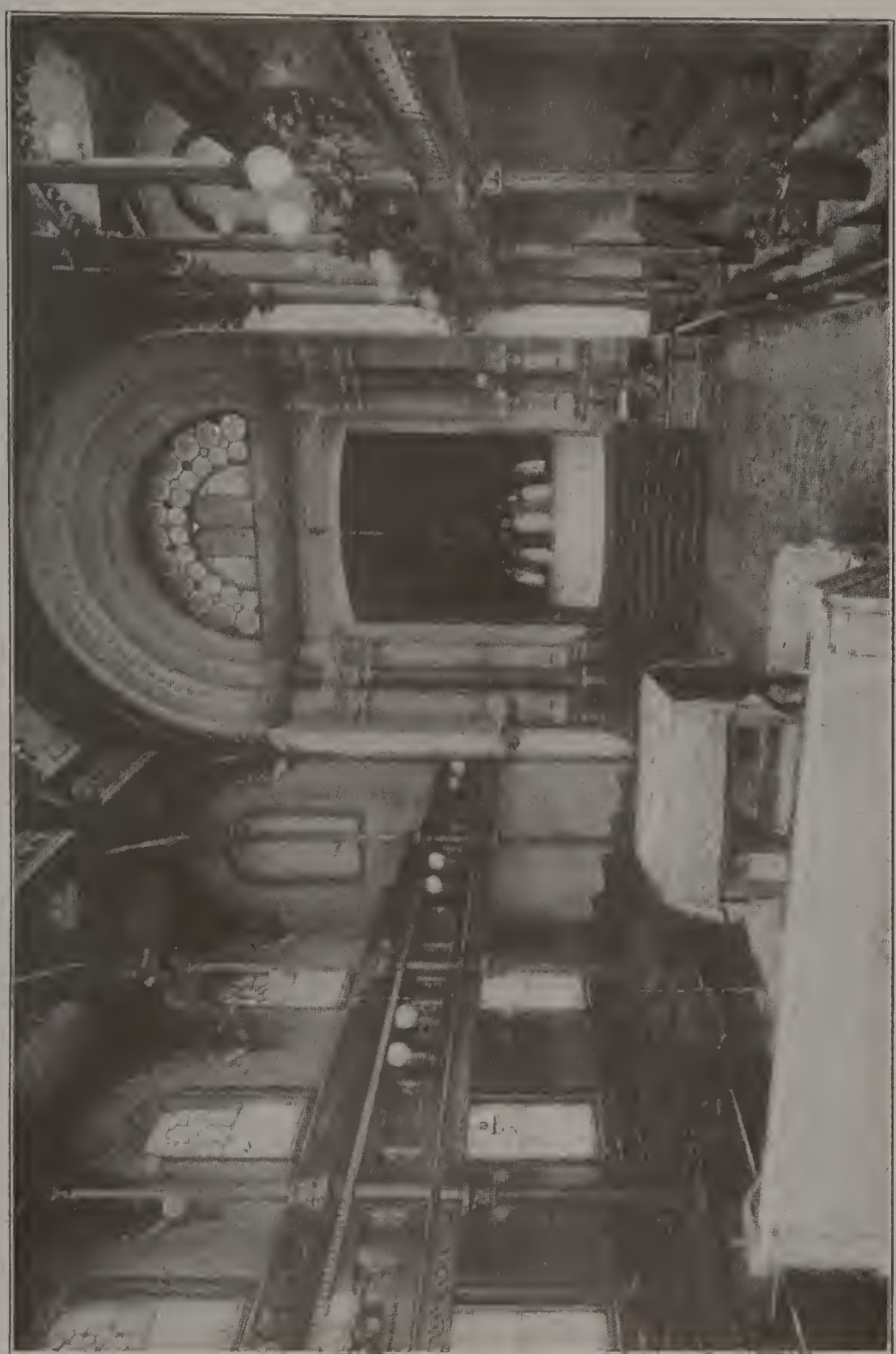
SYMP'TOMS, in Medicine: morbid phenomena by which the physician becomes aware that derangements of some kind have taken place in the economy: a mental effort is requisite to convert these symptoms into signs of disease. A symptom thus converted into a sign of some special disorder tends to constitute the *diagnosis,* or recognition of the disease. Many writers, following Laennec, confine the term *symptom* to the phenomena depending on vital properties; while those phenomena of disease more directly physical they call *signs:* thus there are what may be called *physical signs* and *vital symptoms.* The form, size, color, firmness or softness, heat and odor of a part of the body, the sounds which it yields on percussion or auscultation, etc., afford *physical signs;* while *vital symptoms* may be exemplified in pain, uneasiness, altered or impaired sensations, spasm, vomiting, the accelerated pulse and hot skin of fever, the state of the tongue and of the excretions, etc.

SYN-, *sĭn* [Gr. *sun,* with, together]: a Greek prefix signifying 'with;' together; united—as in *syn*tax: *syn* assumes the various forms of SY, SYL, or SYM, according to the letter which begins the other part of the word—becoming *sy* before *s,* as in *sy*stem; *syl* before *l,* as in *syl*lable; *sym,* before *p, b, ph,* as in *sym*pathy, *sym*bol, *sym*phony.

SYNACME, n. *sĭn-ăk'mē*, or SYNAC'MY, n. *-mĭ* [Gr. *sunakmazō*, I flourish at the same time with another—from *sun*, together; *akmē*, bloom, prime]: in *bot.*, the condition of stamens and pistils when they reach maturity at the same time. SYNAC'MIC, a *-mĭk*, characterized by synacmy, as the plant *Solānum dulcamāra*, the woody nightshade.

SYNÆRESIS, n. *sĭn-ē'rē-sĭs*, or SYNERESIS, n. *sĭn-ĕr'-ĕ-sĭs* [Gr. *sunai'rēsis*, a taking or drawing together—from *sun*, together; *hai'rēō*, I take or seize]: in *gram.*, a figure by which two vowels, usually separated, are drawn together into one syllable, as *o'er* for *over*; the opposite of *diæresis*.

SYNAGOGUE, n. *sĭn'ă-gŏg* [F. *synagogue*—from Gr. *sunagōgē*, an assembly—from *sun*, together; *agō*, I lead]: among the *Jews*, a congregation for worship, or for religious rites; place of worship. SYN'AGOG'ICAL, a. *-gŏj'ĭ-kăl*, pert. to. SYN'AGOG'ICALLY, ad. *-lĭ*.—*Synagogue* signifies both a local assembly of Jewish worshippers and the place of their worship. The origin of this institution is probably traceable to the period of the Babylonian captivity (see Is. viii. 16, etc.. When, at the time of Ezra, and chiefly through Ezra's instrumentality, the ancient order of things was re-established in Judea, synagogues were established in all the towns for common prayer, and primarily for the popular religious instruction of those who could not take part oftener than three times a year, or not even so often, in the altar ritual of the temple at Jerusalem; and for these local congregations a special ritual of lectures and prayers was instituted. From the time of the Maccabees, we find them even in all the villages; and Josephus, Philo, the New Testament, the Mishna, and the Talmud, constantly allude to them. In times post-Talmudic it was a rule that wherever 10 Jews resided a S. should be built. For their antiquity, see Ps. lxxiv. 8; Acts xv. 21. The Sabbaths and feast days were the principal times of assemblage; and the synagogues contributed more than anything else to the steadfast adherence of the people to their religion and nationality. Little is known of special laws respecting the construction of these building, except that the faces of the worshippers should be directed toward Jerusalem (*misrach* = eastward) (see MOSQUE); or that, in accordance with a verse in the Psalms, there should be a slight descent of a step or two on entering a S., or that it should stand, if feasible, on slightly elevated ground, or be in some way made visible afar. Erected out of the common funds or free gifts of the community, it had also to be supported by taxes and donations. It represented a miniature the form of the temple, itself an enlarged type of the earlier tabernacle. At the extreme e. end was the *Aron hakkodesh*, the holy ark, containing several copies of the Pentateuch, from which the periodical readings were



A Synagogue Interior (Philadelphia, Pa.).

chanted. In front of this was the stand of the public reader of the prayers, not far from which was suspended the perpetual lamp (*nēr tamid*). On a raised platform in the middle of the S. was the place of the reader or preacher. The women sat separated from the men by a low partition five or six ft. high. The affairs of the S. were administered by a senate of 'ancients' or 'elders,' with a chief or principal (*Rosh hakkeneseth* = *archisynagogos*): this college managed the inner affairs of the synagogue; called on fit persons to read, pray, or preach; and had the power of excommunication: see Lk. xiii. 14; Acts xiii. 15. The officiating minister, whose office it was to recite the prayers aloud, was called *sheliach tzibbur* — messenger of the community (*angelos ecclesias*, Rev.): his qualifications were, among others, to be active, to be father of a family, not to be rich nor engaged in business, to possess a good voice, to be apt to teach, etc. The *chazzan* (beadle) had general charge of the sacred place, and its books and implements: he had to present the scroll to the reader, and assist on other occasions: during the week-days he had to teach the children of the town or village. He too had to be initiated by a solemn imposition of hands. This name chazzan, however, later came to designate the officiating minister, and it has retained that meaning till this day. Other officials were almoners or deacons, who collected and distributed the alms, and had always to be ready to make up the requisite number of *ten* worshippers. For the prayers used, see LITURGY, JEWISH. The third, sixth, and ninth hours of the day were appointed for a daily worship; but the special days, besides the Sabbaths and feast days, were Monday and Thursday, when the judges sat, and the villagers came to town. At the principal service on the Sabbath morning, lessons were read from the law and the prophets, prayer was offered, a sermon based on the lesson was preached, and a blessing pronounced.

As to the connection between the Jewish S. and the Christian Church, and their respective modes of worship, it is obvious that the principal practices of the church belong, with certain modifications, to the S.; and it has been conjectured that even the melodies of certain hymns still sung in the Roman churches are traceable to the temple and the S. It is, moreover, well known that the early Christian churches were entirely organized after the pattern of the synagogues. As to the judicial power exercised by the officers of the S., see SANHEDRIM. They had, there can hardly be a doubt, a kind of authority with regard to religious transgressions; but how far this extended is not known. The languages used in the early synagogues of Palestine and Alexandria were Hebrew, Aramaic, and Greek respectively.— See JEWS: JEWISH SECTS: LITURGY, JEWISH: ETC.

SYN'AGOGUE, The Great (Heb. *keneseth haggedolah*): in Jewish tradition, an assembly or synod, supposed to have been founded and presided over by Ezra, consisting of 120 men, said to have been engaged in remodelling the national and religious institutions of the Jews after the return from Babylon, and to have held in continuance the supreme religious authority for about 125 years after the cessation of the prophetic line. Since about the 12th century, the rabbinical and the modern Prot. view has been that the Old Test. canon was finally fixed by this body. This Great Synagogue, however, is traditional rather than historical. The first record of it is not earlier than the 2d Christian century; neither Philo nor Josephus mentions it. Palpable chronological discrepancies occur in the early accounts. For these reasons, some modern scholars (Richard Simon, Jacob Alting, Rau, J. D. Michaelis, De Wette, and others —notably Kuenen) have denied the existence of such a continuous synod; and have declared that the term referred merely to the great convocation noted in Neh. viii. 10. Other scholars (Eichhorn, Bertholdt, Ewald, etc.) claim for the tradition some foundation of fact. Certainly, Ezra, contemporary of Artaxerxes, can never have taken his place in it together with Zerubbabel and Joshua, who left Babylon under Cyrus, or with Simeon the Just, who lived at the time of Alexander the Great. The tradition probably never meant anything else than that the institution founded by Ezra, and which lasted till the time of Alexander, comprised 120 men, of whom Simeon was one of the last. There is no reason to doubt that Ezra and Nehemiah did a certain amount of regulative and codifying work which they could not have done without the aid of eminent collaborators—such as ameliorating the administration of justice; developing public instruction; fixing and enlarging the Mosaic laws by certain rules of interpretation; and collecting, purifying, and redacting the sacred books as much as in them lay. There is little reason to believe that they introduced the vowel-points, which have been handed down to us by the Masoretes, instituted the feast of Purim, and sanctioned the Eighteen Benedictions (see Liturgy, Jewish). Whatever of fact may be borne on the tide of Jewish tradition concerning the Great Synagogue, the body certainly disappeared before the Sanhedrim (q.v.) was instituted.

SYNAGOGUE, Architecture of: While there is no distinct type of synagogue architecture, there are certain traditional rules for the interior arrangement that are generally followed—in Europe at least—which give uniformity to the building from within. Facing the entrance is the ark, or receptacle for the scrolls of the law. In the centre is the reading-desk, which is sometimes removed to the upper end and forms also a pulpit which is otherwise before or on the side of the ark. The

seats are arranged on each side of the building, facing each other; while above is the women's gallery. These features are essentially based upon the old Mosaic tabernacle. It is only in the exterior, as a rule, that the architecture can be varied, and here all styles are admitted. Remains of synagogues in Galilee, dating from the first or second century of our era, present marks of Greco-Roman influence in masonry and structure. It speaks well for the Jews that prevailing styles were adapted for such a sacred institution as the synagogue. Under the Moors and early Christian rulers, the synagogues in Spain are Moorish; in Italy many are Renaissance; in Germany often church and synagogue closely resemble each other. Early specimens of the Gothic survive in Prague and Worms; while in the United States are examples of the Byzantine (Buffalo), Classic (New York), Renaissance (Philadelphia), Colonial (Newport), Romanesque (Chicago), etc. In Jerusalem a synagogue is crowned with a mosque-like dome. In St. Petersburg it resembles a Greek church; at Shanghai the structure is pagoda-shaped; and so on. In form, it can be rectangular or otherwise; the cruciform is less adopted. A curious similarity is observed between the wooden synagogues in Russia in the sixteenth century, and the 'Stavekirke' at Borgund, Norway; while the new synagogue at Strasburg recalls a medieval German cathedral. The hospitality of the synagogue to external influences is unquestioned.

SYNAGOGUE, Music of the: with the progress of cantillation in the synagogue ritual, dating probably from the desire to fulfill the spirit of the passage in Neh. viii. 8, which refers to the reading of the law 'distinctly and exhibiting the sense,' so that the people understood, it is natural to infer that this musical declamation developed into vocal melody, solo or choral. The orchestra in the Temple presupposes synagogue music based upon the same system and method, and the psalms, the Temple hymn-book, lent themselves to musical accompaniment. With the fall of the Temple, if music was banished for the time, the synagogue service was permitted to retain its atmosphere of song. The voice of woman was not heard, but certain prayers were chanted in unison. With the gradual addition to the ritual of poetical composition, the 'Hazzan' or the reader became precentor and sang these 'poetries' to certain melodies, selected by their composer or arbitrarily by himself. While the prayers would be recited according to tradition, he allowed himself at times bursts of melody whose intensity had often to be checked.

As to the origin of these tunes or prayer-motives, it is undeniable that just as the synagogue borrowed its architecture, so it echoed the melodies of its environment, and preserved a number of scale forms from the distant past, suggesting the music that is found in the

Catholic, Byzantine and Armenian churches. Its sources of supply are not only those which are perceived in church traditions, but are met as well in the gypsy strain and the Arabic rhythm. In other words, the music of the past is reflected by the music of the synagogue. The Jew found in the synagogue compensation for his banishment from musical enjoyment elsewhere, although florid ornamentation and dazzling technique led later to a sad decline in the art as an element of devotion. The reminiscences of non-Jewish sacred melody are constant both among the Sephardim, the neighbors of the Arabs for many centuries, and the Ashkenazim, who lived equally long in northern Europe.

In addition to material of Jewish origin, the synagogue borrowed folk-melody from the outside world, even if associated with song or dance. This practice gave rise to some controversy, but it became firmly rooted, and one rabbi, Israel Najara of Gaza (d. 1581), published 650 lyrics, written to fit the melodies of Arabic, Turkish, Greek, Spanish, and Italian songs selected by himself.

Synagogue music from the 16th to the 18th centuries was naturally affected by social and political conditions, and the art was at its lowest.

Although in the 16th century Solomon de Rossi strove to improve the music of the synagogue on contrapuntal lines (1622), and some years before (1605) Leon of Modena, with other Italian rabbis, had urged a regeneration of the art, it was not before the past century when progress was made. In 1824 the modern synagogue music saw its first establishment in Berlin. Solomon Sulzer (1840) created a new era by his published synagogue melodies, which, while modeled on the choral music of Roman Catholic Vienna, were still full of the traditional spirit. Other names of merit in this line were Maier Kohn of Munich (1839), Goldberg of Brunswick (1843), Weintraub (1859), Deutsch of Breslau (1871), Lewandowski of Berlin (1870), D. A. DeSola of London (1857), S. Naumbourg of Paris (1847-1863), Cohen and Mosely of London (1887-1899), Consolo of Florence (1892), Löwit and Bauer of Vienna (1889). A number of workers in this field can be credited to the United States, like Welsch, Goldstein, Kaiser, Spicker, etc. It is only within recent decades that instrumental music has become a feature in the synagogue; the strictly conservative, however, forbid its use, as a possible infringement of Sabbath rest, and have a choir of boys and men.

SYNALEPHA, n., or SYNALŒPHA, n. *sĭn'ă-lē'fă* [Gr. *sunaloi'phē*, a melting together—from *sun*, together; *aleit-phō*, I anoint, I besmear]: in *gram.*, the process of cutting off or suppressing a vowel at the end of a word, when the next word begins with a vowel.

SYNANDRÆ, n. plu. *sĭn-ăn'drē* [Gr. *sun*, together; *anēr*, a male, *andros*, of a male]: in *bot.*, a division of gamopetalous dicotyledons, having the carpels unequal in number to the parts of the other whorls, while the stamens are synantherous.

SYNANTHEROUS, a. *sĭn-ăn'thĕr-ŭs* [Gr. *sun*, together; *anthēros*, flowery, blooming—from *anthos*, a flower]: in *bot.*, having the stamens united by their anthers so as to form a tube round the style. SYNAN'THERÆ: see COMPOSITÆ.

SYNANTHOUS, a. *sĭn-ăn'thŭs* [Gr. *sun*, together; *anthos*, a flower]: in *bot.*, having flowers united together. SYNANTHY, n. *sĭn-ăn'thĭ*, the adhesion of several flowers.

SYNAPTASE, n. *sĭn'ăp-tāz* [Gr. *sunaptos*, joined united—from *sun*, together; *haptō*, I connect or tie to]. nitrogenous compound, found in certain oily seeds, as in almonds (see EMULSION). SYNAPTICULÆ, n. plu. *sĭn'ăp-tĭk'-ū-lē* [dim.]: transverse props, sometimes found in corals, extending across the loculi like the bars of a grate.

SYNARTHROSIS, n. *sĭn'ăr thrō'sĭs* [Gr. *sunarthrōsis*, a being joined together—from *sun*, together; *arthron*, a joint]: in *anat.*, a union of bones without motion. SYNARTHRO'DIAL, a. *-dĭ-ăl*, pertaining to or resembling synarthrosis.

SYNCARPIUM, n. *sĭn-kâr'pĭ-ŭm* [Gr. *sun*, together, *karpos*, fruit]: in *bot.*, an aggregate fruit having the carpels of a multiple ovary formed into a solid mass, with a slender receptacle. SYNCARPOUS, a. *sĭn-kâr'pŭs*, having the carpels united so as to form one ovary or pistil. SYNCARPY, n. *sĭn'kâr-pĭ*, the accidental adhesion of several fruits, forming an abnormal condition.

SYNCATEGOREMATIC, n. *sĭn-kăt'ĕ-gŏr-ĕ-măt'ĭk* [Gr. *sun*, with; *katēgŏrēma*, a predicate]: in *logic*, a word which cannot of itself be used as a term—e.g., an adverb, a preposition, etc.

SYNCHONDROSIS, n. *sĭn'kŏn-drō'sĭs* [Gr. *sun*, together; *chondros*, a cartilage]: in *anat.*, the connection of bones by means of cartilage or gristle.

SYNCHRONAL, a. *sĭn'krō-năl*, or SYN'CHRONOUS, a. *-nŭs* [Gr. *sun*, with; *chronos*, time]: happening at the same time; of the same date or epoch; simultaneous. SYN'CHRONAL, n. that which happens at the same time with something else. SYN'CHRONOUSLY, ad. *-lĭ*. SYNCHRONIC, a. *sĭn-krŏn'ĭk*, or SYNCHRON'ICAL, a. *-ĭ-kăl*, same meaning as *synchronal*. SYNCHRON'ICALLY, ad. *-lĭ*. SYNCHRONIZE, v. *sĭn'krō-nīz*, to agree in time; to be simultaneous; to make to agree in time. SYN'CHRONIZING, imp. SYN'CHRONIZED, pp. *-nīzd*. SYNCHRONIZATION, n. *sĭn'krō-nĭ-zā'shŭn*, concurrence of events. SYN'CHRONISM, n. *-nĭzm*, a happening at the same time; simultaneousness; in *hist.*, the tabular arrangement in one view of contemporary persons things, and events, according to dates.

SYNCHYSIS, n. *sĭng'kĭ-sĭs* [Gr. *sungchusis*—from *sun*, together, with; *chusis*, a pouring; *cheō*, I pour]: in *path.*, confusion of the humors of the eye, generally produced by a violent blow, or from inflammation of the uvea, also an effect of violent ophthalmia: in *rhet.*, confused arrangement of words which obscures the sense.

SYNCLINAL, a. *sĭn-klī'năl* [Gr. *sun*, together; *klinō*, I lean or bend]: in *geol.*, applied to strata that dip from opposite directions inward, like the leaves of a half-opened book, or which incline to a common centre, forming a trough or basin-shaped hollow. SYNCLINAL AXIS, the line of curve in which such a trough or basin-shaped hollow trends. ANTICLINAL LINE, or ANTICLINAL AXIS, the wave-line or ridge-curve of direction of strata which dip in opposite directions from a common ridge, like the roof of a house.—See SYNCLINORIUM.

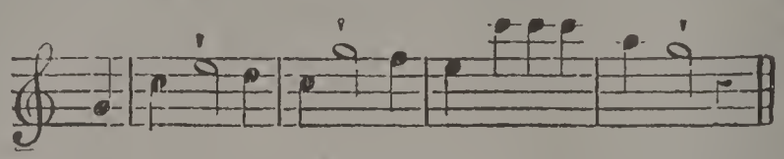
SYNCLINORIUM, n. *sĭng-klĭ-nō'rĭ-ŭm* [Gr. *sún*, together; *klínein*, to incline; *oros*, mountain]: mountain or range consisting of strata inclined together—i.e., curving downward toward a central axis. Synclinal has long been in use to denote such strata; and synclinorium (plural synclinoria), as well as the opposite, anticlinorium, was happily introduced by Prof. J. D. Dana to indicate the kind of mountain structure. The principal mountain ranges of the earth are synclinoria, and necessarily so; because, first, a curve of strata upward, if high and abrupt, would produce a broken mass rapidly reduced by atmospheric agencies, aided by gravitation acting on broken strata that incline with the slope; whereas synclinal strata, piercing the mountain transversely to the slope, strengthen the mass and resist degradation, much in the same way that an artificial terrace of earth is often upheld against the loosening influence of rain by planks and stakes set transversely to the slope. Secondly, the process by which great mountain ranges were formed necessitated for the most part a general synclinal structure. The most rational theory is that the continents were from the first the comparatively stable portions of the crust; and as the crust shrank by internal cooling, the more yielding areas of the oceans were depressed. This would produce a bulging on the continental borders, as a hoop of stout wire pressed in on one side must necessarily project on either side of the depressed part. There is evidence of such an anticlinal sea-border formerly, outside of our present coast; and the bulging produced a corresponding depression along the area now occupied by the Appalachian ranges. This alone, however, might not have created the great trough, which was the first stage of mountain-making. It should be remembered that the sinking crust beneath the sea *hinged* on to the stable continent; hence on the border there would be displacement, or yielding, under the great tension of the shrinking crust and the lateral thrust against the continent from the subsiding sea-area, as illustrated by the depressed circle of wire. Howsoever forces might combine, it is plain that a trough was first in formation, for the deposits of material, forming strata, are immensely thick in

every great mountain range—40,000 ft. in the Alleghanies against 3,000—5,000 elsewhere. This subsiding mass, continually filling in, was at length brought in its lower portions to a depth where it was weakened, if not fused, by the internal heat of the earth; and the result was that the whole collapsed, was pressed together, resulting not only in many parallel billowy ranges (dying away toward the interior of the country) but in a piling up of the vast mass of material, forced into a narrower space, and hence rising into Alleghanies, Alps, and Himalayas, somewhat as, on a small scale, colliding railway-trains or flood-wood logs are piled up high. In general the collapse was the forcing upward of the great filled trough; and any incidental anticlinals would be broken up and worn away, leaving the salient ranges in the form of synclinals. The crises were of different ages: the Blue Ridge at the close of Archæan time; the Green Mts. at the end of the Silurian; the Alleghanies at the termination of the Carboniferous. The Rocky Mts. were finally lifted to their present full height in the Tertiary and afterward, by a *geanticlinal* (a vast upbending of the crust, in this case a thousand miles wide) at a time when the rigid mass was ruptured only here and there, emitting great outpourings of igneous rock (forming the 'mesas'), instead of being crushed together. Compared with the great ranges facing oceans, the Catskills, where the strata lie as deposited, except somewhat tilted, are inconsiderable exceptions. Such mountains are effects of circumdenudation, the surrounding deposits having been worn away and carried off, probably to a considerable extent before consolidation.

The theory of lateral thrust from subsiding sea-beds, against continental borders, is confirmed by the parallel ranges, constituting mountain systems. These are highest opposite the largest and deepest oceans; the ranges, also, nearest the ocean (excluding the minor 'coast ranges') are highest, the more interior successively less lofty and bold (see MOUNTAINS, figure); and the slope of each range is steepest toward the sea.—These are the general facts, with some exceptions that may be referred to interfering or subsequently acting causes. A table-cloth of sufficient thickness will show miniature ranges with these peculiarities when pushed by a hand pressing on the table.

SYNCOPE, n. *sĭn'kŏ-pē* [Gr. *sungkŏpē*, a cutting off, a shortening—from *sun*, together; *kŏptō*, I cut off]: in *gram.* a throwing out of one or more letters from the middle of a word, as *ne'er* for *never*, *e'en* for *even:* in *med.*, a fainting or swooning by the interruption of the action of the heart (see FAINTING): in *music*, same as *Syncopation* (q.v.). SYN'COPATE, v. *-pāt*, to contract a word by syncope: in *music*, to begin, as a note, on the unaccented part of a measure, and end on the accented. SYN'COPATING, imp. SYN'COPATED, pp. SYN'COPA'TION, n. *-pā'shŭn*, the contraction of a word by suppressing one or more letters in the middle: in *music*, act of syncopating; performance of a passage by syncopating the notes. Notes which begin on the unaccented part of a measure, and end on the accented

are called syncopated or driving notes: their effect is to invert the rhythm, and lay an emphasis on the usually unaccented part of the measure, e.g.:



SYN'COPIST, n. *-pĭst*, one who contracts words by syncope.

SYNCRETISM, n. *sĭn'krē-tĭzm*, or SYN'CRATISM, n. *-krā-tĭzm* [Gr. *sungkrētismos*, union against a common enemy—from *sun*, with; *krētizō*, to behave like Cretans, i.e., to sink their differences and combine against a common enemy]: the attempt to blend the tenets of different schools of philosophy or sects of religion into one system in order to produce union and concord. SYN'CRETISTS, n. plu. *-tĭsts*, specially, followers of Calixtus, Lutheran divine, who attempted in the 17th c. to promote concord among Christians of all sects, Prot. as well as Rom. Cath. (see CALIXTUS, GEORG): also, certain followers of the Platonic philosophy in the 15th c. SYNCRETIC, a. *sĭn-krĕt'ĭk*, blending parties or tenets. SYNCRETISTIC, a. *sĭn'krē-tĭs'tĭk*, pertaining to syncretism.

SYNCRISIS, n. *sĭng'krĭ-sĭs* [Gr., a comparison—from *sun*, together, with; *krisis*, a judging; *krinō*, I judge]: in *rhet.*, a figure by which opposite persons or things are compared.

SYNDESMOSIS, n. *sĭn'dĕz-mō'sĭs* [Gr. *sun*, together; *desmos*, a bond—from *deō*, I bind]: in *anat.*, the union of one bone with another by ligaments.

SYNDIC, n. *sĭn'dĭk* [Gr. *sundikŏs*, helping in a court of justice, an advocate—from *sun*, together; *dikē*, justice: F. *syndic*]: officer invested with different powers in different countries: one chosen to transact business for others. In Geneva the chief magistrate was formerly called the S. The syndics of cities in France, under the old régime, were officers delegated by the municipality as agents or mandatories; the various trading companies in Paris and the university had their syndics; and in the Univ. of Cambridge, syndics are members of special committees of members of the senate, appointed by grace from time to time for specific duties (see UNIVERSITY). SYN'DICATE, n. *-dĭ-kāt*, the office or jurisdiction of a syndic; a council or body of syndics: a combination of capitalists to promote a particular financial scheme, e.g., a foreign loan, a public company, etc.: V. in *OE.*, to judge or censure.

SYNECDOCHE, n. *sĭn-ĕk'dŏ-kē* [Gr. *sunek'dŏchē*, the understanding one thing with another—from *sunekdech'-ŏmai*, I join in receiving—from *sun*, together; *ek*, out; *dech'ŏmai*, I receive]: in *rhet.*, a figure in which the whole is put for a part, or a part for the whole; e.g., a door for a house, a sword for all weapons of war. SYNECDOCHICAL, a. *sĭn'ĕk-dŏk'ĭ-kăl*, expressed by synecdoche, or implying one. SYN'ECDOCH'ICALLY, ad. *-lĭ*.

SYNECHIA, n. *sĭn-ĕ-kī'ă* [Gr. *sunĕcheĭ'a*, a holding together—from *sun*, with; *ĕchō*, I have, I hold]: in *med.*, a disease of the eye in which the iris adheres to the cornea, or to the capsule of the crystalline lens.

SYNERESIS: for SYNÆRESIS, which see.

SYNERGIDÆ, n. plu. *sĭn-ĕr'jĭ-dē* [Gr. *sun*, with; *ergon*, work]: in *bot.*, certain accessory cells which occur in the developing embryo-sac of flowering plants.

SYNERGIST, n. *sĭn-ĕr'jĭst* [Gr. *sun*, together; *ergon*, work]: one of a party in the Lutheran Church who propagated about the end of the 16th c. the doctrine that 'grace communicated to adult persons so as to draw them to God required a corresponding action of their own free will in order to become effectual.' SYN'ERGIS'TIC, a. *-tĭk*, or SYN'ERGIS'TICAL, a. *-tĭ-kăl*, pertaining to the synergists; acting or working together; co-operating. SYNER'GISM, n. *-jĭzm*, the doctrine of the synergists—that in the work of conversion the will of man is not wholly passive, but can co-operate, through consent, with the Divine Spirit. About 1557 the question was hotly discussed by the Prot. theologians Pfeffinger, Flacius, and Strigel, and soon the whole theological world was wrangling over the point. The Wittenberg divines were in favor of, the Mansfeld divines against, synergism. Finally, the *Concordien formel*, in its third article, condemned it.

SYNESIUS, *sī-nē'shĭ-ŭs:* bishop of Ptolemais in Libya; b. near the beginning of the last quarter of the 4th c.; d. prob. 414. In 393 he became a pupil of Hypatia in Alexandria. Returning home 397, he was 3 yrs. at Constantinople at the head of an embassy seeking abatement of taxes, awaiting audience with the emperor, before whom he made an oration that is still preserved. From 400 to 410 he was mostly on his rural estate, visiting Athens 402. Chosen bishop, he stipulated that he should be free to dissent on questions of the soul's creation, a literal bodily resurrection, and the final destruction of the world. He excommunicated a prefect for interfering with the church's right of asylum. Of his writings are preserved *Dio, sive de suo ipsius Institute; Encomium Calvitii* (Praise of Baldness); *De Providentia; De Insomniis;* also 157 Epistles and 12 Hymns.

SYNGENESIAN, n. *sĭn'jĕ-nē'zhĭ-ăn*, or SYN'GENE'SIOUS, a. *-ŭs* [Gr. *sun*, with; *genĕsis*, generation, birth]: in *bot.*, having the stamens united in a cylindrical form by the anthers, as in the ord. *Compositæ* (q.v.).

SYNGNA'THIDÆ: see PIPE-FISH.

SYNOCREATE, a. *sĭn-ŏk'rē-āt* [Gr. *sun*, with; L. *ocrĕātus*, furnished with greaves or leggings; *ocrĕa*, a greave]: in *bot.*, having stipules uniting together on the opposite side of the axis from the leaf.

SYNOD, n. *sĭn'ŏd* [Gr. *sunŏdŏs*, a meeting—from *sun*, with; *hodos*, a way, a coming: F. *synode*]: ecclesiastical convention; a council (see below). SYN'ODAL, a. *-ŏ-dăl*, pert. to a synod: N. money anciently paid to the bishop at the Easter visitation. SYNODIC, a. *sĭn-ŏd'ĭk*, or SYNOD'ICAL, a. *-ĭ-kăl*, pert. to or transacted in a synod: pert. to the period which elapses between a planet's appearance at one of the nodes of its orbit and its return to the same node: see NODES: MONTH. SYNOD'ICALLY, ad. *-lĭ*.—*Synod* in general signifies a meeting, but is almost exclusively applied to ecclesiastical assemblies usually for deciding, sometimes for only deliberating, on doctrinal or disciplinary subjects. In church law, several kinds of synods—called also councils are enumerated: (1) ecumenical or general, of the entire church; (2) national—the church of an entire nation; (3) provincial—the church of a province; (4) diocesan, the church of a single diocese.—(See COUNCIL—several titles.)—By the law of the Rom. Cath. Church, the decrees of a national or provincial S. are submitted to the pope's decision. A diocesan S. is convened by the bp., and consists of the members of the chapter, the beneficed clergy having the permanent care of souls, and the heads of the communities of regular clergy.—Synods of the English Church are held only by authority of the crown. A Presb. synod consists of only the ministers and elders of adjoining presbyteries within a particular district, generally one elder for each congregation: it is subordinate to the general assembly, when there is a general assembly.

SYNOD, GENERAL, of the Evangelical Lutheran Church in North America: see LUTHERAN CHURCH, EVANGELICAL.

SYNŒCIOUS, a. *sĭn-ē'shŭs* [Gr. *sun*, together; *oikos*, a house]: in *bot.*, having antheridia and archegonia on the same receptacle.

SYNONYM, n., or SYNONYME, n. *sĭn'ō-nĭm* [Gr. *sunōnŭmos*, having the same name or meaning—from *sun*, together; *ŏnŏma*, a name]: word having the same, or nearly the same, signification as another word in the same language, and which may be interchanged with it without altering the meaning of the context: in general, a word used in the wide sense to indicate a similar sense to another word; or one having something in common with another, though not identical; plurals, SYN'ONYMS and SYN'ONYMES, *-nĭmz*, or SYNONYMA, *sĭn-ŏn'ĭ-mă*. SYN'ONYM'ICON, n. *-ĭ-kŏn*, a book of synonyms. SYNON'YMIZE, v. *-mīz*, to express the same meaning in different words. SYNON'YMIZING, imp. SYNON'YMIZED, pp. *-mīzd*. SYNON'YMIST, n. *-mĭst*, one who collects and explains synonyms. SYNON'YMOUS, a. *-mŭs*, having the same meaning; expressing the same thing. SYNON'YMOUSLY, ad. *-lĭ*. SYNON'YMY, n. *-mĭ*, the quality of being synonymous; a figure by which synonymous words are used to amplify a discourse.—*Synonym* has sometimes a loose, but usually a restricted application. When any one of several words will serve to name or express the same thing, that thing is said to be *polyonymous*, or many-named; and the words are called *synonyms:* in this wide sense, *man*, *soldier*, *captain*, *general*, *Frenchman*, might be called syno-

nyms, as they all can be applied to denote the same individual—e.g., Napoleon: see NOUN. But S. is commonly applied in a restricted sense to words having substantially the same meaning, with only slight shades of difference—e.g, *observe* and *remark*. In a settled and matured language, no two words can have exactly the same meaning; in such a case, one would be superfluous, and would be gradually dropped. Many words originally identical in application, have become differentiated by usage, each being appropriated to a special variety of the general notion.

The English language abounds in pairs of synonyms like *sharp* and *acute*, of which one is Anglo-Saxon, the other borrowed from the Latin. It would be difficult to find a case of more exact correspondence of sense than *acutus* in Latin, and *sharp* (Ger. *scharf*) in Teutonic; but *acute* in English has become nearly confined to the metaphorical sense of sharpness of the intellect or of the senses, one of the few cases of its retaining the primary, physical signification being in the technical phrase an 'acute angle.' *Sharp* is applied both in the physical sense and in the metaphorical; but metaphorical *sharpness* is not exactly the same thing as *acuteness*. A 'sharp' lad is one quick in apprehension and movement; an 'acute' intellect is one having great power of penetration and discrimination; while in a lawyer or financier of 'sharp' practice a reprehensible moral quality is implied.

SYNOPSIS, n. *sĭn-ŏp'sĭs* [Gr. *sunop'sis*, the act of viewing at a glance—from *sun*, together; *opsis*, a view]: a general view; a collective view of any subject in a condensed form. SYNOP'SES, plu. *-sēz*. SYNOP'TIC, a. *-tĭk*, or SYNOP'TICAL, a. *-tĭ-kăl*, affording a general view; exhibiting the principal parts at one view, or in a condensed form. as the synoptic gospels of Saints Matthew, Mark, and Luke exhibit the life of Christ. SYNOP'TICALLY, ad. *-lĭ*.—SYN. of 'synopsis': abridgment; compendium; abstract; epitome.

SYNOSTEOSIS, n. *sĭn-ŏs'tē-ō-sĭs* [Gr. *sun*, together; *ŏstĕŏn*, a bone]: in *anat.*, the premature obliteration of certain of the sutures of the skull. SYN'OSTEOT'IC, a. *-stĕ-ŏt'ĭk*, having the character of synosteosis.

SYNOVIA, n. *sĭn-ō'vĭ-ă* [Gr. *sun*, with; L. *ovum;* Gr. *ōŏn*, an egg]: a fluid secreted in the cavity of joints for the purpose of keeping them moist. SYNO'VIAL, a. *-ăl*, pertaining to or secreting synovia. SYNOVITIS, n. *sĭn'ŏ-vī'tĭs* [*itis*, denoting inflammation]: inflammation of the synovial membrane.

SYNO'VIAL MEMBRANES AND FLUID: membranes lining the joints, and the fluid which these membranes secrete. In every joint in which considerable range of motion is required, the osseous segments (or contiguous extremities of bones) are separated by a space, called the cavity of the joint. The end of each of the bones entering into the composition of the joint is incrusted by a layer of articular cartilage adapted to its form; and the entire cavity is lined by a delicate membrane which secretes

a peculiar viscid matter, termed *synovia*, or *synovial fluid*, for lubricating the inner surface. In its microscopical characters, a synovial membrane closely resembles a Serous Membrane (q.v.), though there are certain points of difference. Like a serous membrane, a synovial membrane is always a closed bag, like the pleuræ, e.g., with an attached and a free surface, the latter smooth and moist. A very simple form of synovial membrane—anatomically known as a *bursa*—serves to facilitate the gliding of a tendon of a muscle or of the integument over a projection of bone; it consists of a bag connected by areolar tissue with the neighboring parts, and secreting a fluid in its interior. These bags are sometimes prolonged into *synovial sheaths*, which surround long tendons, such as those of the flexor and extensor muscles of the fingers and toes. In deep-seated Whitlow (q.v.), when inflammation extends to one of the sheaths, and occasions formation of adhesions, the motion of the inclosed tendon is destroyed, and a stiff finger results.

The *synovial fluid*, or *synovia*, derives its name from its resemblance to the white of an egg: it consists of water, holding in solution mucin, albumen, extractive matters, fat, and inorganic salts.

SYNSEPALOUS, a. *sĭn-sĕp'ă-lŭs* [Gr. *sun*, with; Eng. *sepal*]: in *bot.*, having the sepals all united by their edges; same as *gamo-* or *mono-sepalous*.

SYNSPERMOUS, a. *sĭn-spĕr'mŭs* [Gr. *sun*, with; *sperma*, seed]: in *bot.*, having several seeds united. SYNSPERMY, n. *sĭn'spĕr-mĭ*, the union of several seeds.

SYNSPOROUS, a. *sĭn-spō'rŭs* [Gr. *sun*, together; *spora*, a seed]: propagating by conjugation of cells, as in algæ.

SYNTAX, n. *sĭn'tăks*, or SYNTAXIS, n. *sĭn-tăks'ĭs* [Gr. *suntaxis*, arranging or placing together—from *sun*, with; *tassō*, I put in order]: in *gram.*, proper arrangement of words under established rules and according to the best usage in order to express ideas; the grammatical construction of sentences. A word expresses a single notion, but by itself is little more than an articulate sound. A succession of such sounds, properly arranged and connected for the expression of ideas, becomes language. The art of constructing sentences is therefore not less important than the power of speech; it is indeed the intellectual part of language and a characteristic of reason. The first step is the analysis of sentences—the study of their anatomy and physiology, as it were (see SENTENCE). A clear perception of the mutual relations of the several members of a sentence makes the usual rules of syntax appear self-evident truths, and in most cases superfluous. Most of these rules fall under the heads of (1) Concord and Government; (2) Order of Words, or Collocation. SYNTACTICAL, a. *sĭn-tăk'tĭ-kăl*, or SYNTAC'TIC, a. *-tĭk*, pertaining to syntax, or according to its rules. SYNTAC'TICALLY, ad. *-lĭ*.

SYNTERESIS, n. *sĭn'tĕ-rē'sĭs* [Gr. *suntērēsis*, a watching closely—from *sun*, with; *tērĕō*, I watch]: in *med.*, preservative or preventive treatment; prophylaxis: in *metaph.*, conscience viewed as the internal repository of the laws of right. SYN'TERET'IC, a. *-ĭk*, tending to preserve health; prophylactic. SYN'TERET'ICS, n. plu. *-ĭks*, that department of medicine which relates to the preservation of health.

SYNTEXIS, n. *sĭn-tĕks'ĭs* [Gr. *suntēxis*, decay, consumption—from *sun*, with; *tēkō*, I melt]: a wasting of the body as from consumption. SYNTEC'TIC, a. *-tĕk'tĭk*, or SYNTEC'TICAL, a. *-tĭ-kăl*, pertaining to syntexis; wasting with consumption.

SYNTHERMAL, a. *sĭn-thĕr'măl* [Gr. *sun*, with; *thermē*, heat]: having the same degree of heat.

SYNTHESIS, n. *sĭn'thĕ-sĭs* [Gr. *sunthĕsĭs*, a putting or placing together—from *sun*, together; *thesis*, a placing; *tithēmi*, I place]: the uniting of elements to form a compound (see SYNTHESIS, in Chemistry): in reasoning, the opposite of *analysis;* the putting of two or more things together to form a whole: in *surg.*, operation by which divided parts are reunited. SYN'THESIZE, v. *-thĕ-sīz*, to combine two or more things into one. SYNTHETIC, a. *sĭn-thĕt'ĭk*, or SYNTHET'ICAL, a. *-ĭ-kăl*, pertaining to synthesis; compounding. SYNTHET'ICALLY, ad. *-lĭ*.

SYN'THESIS, in Chemistry: the building up of a more or less complicated product from its elementary constituents. As the S. of inorganic compounds is usually very simple, this article presents that of organic compounds. To take a very common substance as illustration, there is no difficulty in resolving sugar into its ultimate elements, i.e., in ascertaining its composition by analysis. If we heat a little sugar to redness in a glass tube, it leaves a black deposit, which is carbon, while a liquid, which is water, distils over; and on electrolyzing this liquid, we resolve it into hydrogen and oxygen; so that we can thus show that sugar is composed of the ultimate elements, carbon, hydrogen, and oxygen. An analysis of this kind shows that sugar may be represented by the formula $C_{12}H_{22}O_{11}$, and that one atom, or any given weight of it, contains 144 atoms or parts by weight of carbon, 22 of hydrogen, and 176 of oxygen. This pulling to pieces of the sugar is an easy matter, and has been known to chemists for nearly a century, but the putting together of the pieces i.e., the S. of sugar, is very much more difficult. We may bring together carbon, hydrogen, and oxygen in the due proportions, and may shake them all together, or heat them, or cool them, and yet we shall never get them to combine so as to form sugar. Ethyl alcohol consists of 2 parts of carbon, 6 parts of hydrogen, and 1 part of oxygen; but no alcohol ever results from making such a mixture. Neither sugar nor alcohol can exist at the temperature to which it is requisite to raise our mixture of carbon, hydrogen, and oxygen, in order to get chemical action to set in. At ordinary temperatures, the organic elements will not enter into combination; at high temperatures they combine

indeed, but yield comparatively few compounds. There was a general belief that organic products, such as sugar, alcohol, urea, oxalic acid, taurin, leucine, etc., required for their production a mysterious so-called *vital force*, totally distinct from the ordinary forces acting on matter. The first blow to this now obsolete doctrine was struck by Wöhler 1828, when he discovered that the organic base *urea* might be artificially obtained: see ORGANIC COMPOUNDS. Three years afterward, Pelouze obtained *formic acid* from inorganic materials. In 1845, Kolbe, by a complicated process, effected the synthesis of *acetic acid*, consequently, indirectly, of its derivatives, among which are *acetone*, product of the destructive distillation of acetates; *marsh gas*, obtained by distilling an acetate with a caustic alkali; and *ethylene;* and the electrolysis of acetic acid, which Kolbe accomplished a few years afterward, yielded methyl and oxide of methyl, which latter could be transformed into any other methylic compound.

New and simpler methods have since been suggested by various chemists, among whom Berthelot especially must be mentioned; and enormous additions have been made to the list of so-called organic compounds which have been synthetically constructed. We give a description of the mode of producing alcohol synthetically, and shall then show that from it, as a starting-point, an immense number of other organic compounds can be synthetically produced. To obtain ethyl alcohol synthetically, several distinct steps are necessary. The first is the formation of *ethylene* (olefiant gas), C_2H_4, by addition of the elements of water H_2O. When ethylene gas is passed into strong sulphuric acid heated to 320°—338° F., the gas is absorbed, and ethyl-sulphuric acid, $C_2H_6SO_4$ is produced: this, distilled with water, yields sulphuric acid and ethyl (vinic or ordinary) alcohol:

$$C_2H_6SO_4 + H_2O = H_2SO_4 + C_2H_6O.$$

From this ethyl alcohol can in turn be obtained propyl alcohol C_3H_8O; from propyl alcohol can be obtained butyl alcohol, $C_4H_{10}O$; and from this, amyl alcohol, $C_5H_{11}O$. From the propyl alcohol thus obtained, we get by oxidation *propionic acid*, from which *lactic acid*, the acid of sour-milk, may be obtained; similarly, butyl alcohol yields butyric acid, every alcohol, in short, yielding a corresponding fatty acid by oxidation. *Glycerine*, the base of the fats, also may be obtained by a somewhat circuitous process. By combining glycerine with propionic acid, and with the other fatty acids which may be synthetically formed, we obtain several oils and fats similar to those which occur as natural products. The case of *taurin*, $C_2H_7SNO_3$, is even more striking; it is a product of various glandular metaphorphoses, but its chief source is the bile, where it exists in conjugation with cholic acid as tauro-cholic acid. This highly complex substance can readily be formed in the laboratory from sulphuric acid, alcohol, ammonia, each of which is capable of being built up from its constituent elements.

Sugar has been obtained by Berthelot from glycerine, a

substance obtainable by purely inorganic means; but as he effected the conversion of the glycerine into sugar by the action of putrefying animal tissue, the sugar thus formed can scarcely be regarded as of purely inorganic origin, though the animal tissue acted only catalytically, or as a ferment, and did not contribute any actual material to its formation. There is, however, no doubt that an unexceptional mode of producing this important alimentary substance will soon be devised, since bodies strictly allied to sugar have been already obtained. Another artificial compound of great interest in an industrial view is *toluene* (toluol, or methyl-benzine), $C_6H_5(CH_3)$.

Important and interesting as is Synthesis in a scientific view, it has not yet been developed into an economic process for producing staple organic compounds. By no processes at present known could we produce sugar, glycerine, or alcohol from their elements at one hundred times their present cost as obtained through the agency of vitality.

See Berthelot's *Chimie Organique fondée sur la Synthèse* (1860), and his lectures on the *Leçons de Chimie professées en 1860 et 1862;* various lectures by Wanklyn, Frankland, and others, delivered at the Royal Institution; Odling's lectures *On Animal Chemistry* (1865); and recent works on organic chemistry, such as Miller's *Elements,* Roscoe and Schorlemmer's *Treatise on Chemistry,* and Watts's *Manual of Chemistry.*

SYNTONIN, n. *sĭn'tŏ-nĭn* [Gr. *sun,* together; *tŏnŏs,* a tension, a bracing—from *teinō,* I stretch]: muscle fibrin: principal constituent and essential basis of all the contractile tissues. Syntonin contains, in 100 parts: carbon, 54.06; hydrogen, 7.28; nitrogen, 16.05; oxygen, 21.50; and sulphur, 1.11. It may be obtained from muscular fibrin in the form of a coherent, elastic, snow-white mass; but whether it exists in the living body in solid form or in solution is undecided. Many recent physiological writers hold the latter view, and maintain that the phenomenon of cadaveric rigidity (*rigor mortis*) is due to the syntonin coagulating spontaneously after death.

SYPHILIS, n. *sĭf'ĭ-lĭs* [word used by Fracastorio, Italian (1530), to signify a sort of leprosy or epidemic skin disease: perhaps from Gr. *suphar,* slough or shrivelled skin]: form of the venereal disease, very contagious. SYPH'ILIT'IC, a. *-lĭt'ĭk,* pertaining to or affected with syphilis. SYPH'ILIZA'TION, n. *-ĭ-zā'shŭn,* inoculation of syphilitic matter.—*Syphilis,* a disease whose ravages have been extensive among soldiers and sailors in various countries, as well as among those in private life. Syphilis is a contagious disease usually, but by no means always, propagated by impure sexual intercourse. The following is a brief history of the course of the disease if not checked by remedial agents. At an uncertain period, three to ten days, after exposure to the infection, one or

more venereal ulcers (commonly known as *chancres*) appear on the generative organs. This is distinguished from other, non-syphilitic, sores by an induration of the surrounding tissues, whence the term, hard chancre, usually applied to it.

Generally, one to two months after the first appearance of the induration, febrile symptoms occur, usually followed by an exanthematous eruption of the skin, often accompanied by sore throat: this eruption, which is of a rose-red color, is called *roseola*. The syphilitic eruptions which usually follow this primary rash may assume the most varied forms. These are known as the secondary symptoms, or the 'secondaries.'

Of the most important *tertiary syphilitic affections* are those which attack the bones and their coverings. They may be included under the heads of acute and chronic periostitis (the latter very common), nodes and exostosis, inflammation of bone, caries, and necrosis. Next to these are tertiary affections of the skin and mucous membrane, which consist mainly of intractable ulcerations attacking the face (especially the nose and lips), nails, ears, and mucous membranes of the various openings of the body (mucous patches), diseases of the glands, and elastic swellings, composed of a sac containing a pultaceous or gummy substance, occurring in various parts of the body. These latter are called gummy tumors, or gummata.

Syphilis is an exceedingly contagious disease and is spread by a great variety of ways. Many cases are acquired from kissing when one of the parties is suffering from mucous patches in the mouth; and the poison may be conveyed by spoons, pipes, cups, and any other objects which have been moistened by the saliva of a person with mucous patches, and thus carried to the mouth of another person. This mode of infection, the 'syphilis of the innocent,' is believed by many to be even more common than that by sexual intercourse; it is so common, indeed, that the stigma attached to one having the disease is most unjust.

The Syphilis of Children.—If the constitution of either the father or mother of an infant is saturated with the syphilitic poison, the child may be born with certain symptoms indicating that it is suffering from *congenital syphilis*. Moreover, the child of a mother having a primary sore, but no constitutional symptoms, may be inoculated with syphilis during the act of delivery; or the disease may be communicated in vaccination (if the matter be derived from an impure source, and be not bovine virus); or by contact with syphilitic sores on the persons of wet-nurses or others. All these cases are included in the *infantile* variety of the disease. Congenital syphilis frequently causes the death of the fetus at about the fourth or fifth month. In the majority of cases, the disease does not show itself till about six weeks after birth. There is scarcely a doubt that a woman carrying a syphilitic fetus may become infected with secondary

syphilis, and this explains how it is that women who have never had the primary infecting sore occasionally show all the symptoms of secondary syphilis after living for some years with husbands similarly affected. Cases in which the nipple of the wet-nurse has been infected by a syphilitic infant are not rare.

Health inspections, in special reference to venereal diseases, are made weekly in some armies by the surgeon or assistant surgeon; and similar inspections of all recognized prostitutes have long been made by legal authority in many parts of Europe. The results of such legal action in Britain have not been satisfactory; and in the United States such action is opposed by public sentiment, and has scarcely been attempted.

Toward the close of the 15th c. a great epidemic of syphilis pervaded Europe, and was then supposed to have been imported from the new world: in the 16th c. syphilis was recognized as the result of a specific virus. The history of this disease from the middle of the 18th c. is divisible into three distinct periods, in each of which very different views have been prevalent: 1. *The period and doctrine of Hunter,* who believed that the various forms of syphilis and gonorrhea depend on one and the same poison—a view taught by Carmichael in Dublin, Cazenave in Paris, and others. 2. *The period and doctrine of Ricord,* who proved that gonorrhea was quite distinct from syphilis, and that inoculation with gonorrheal matter will not cause a chancre; and that there are *two* classes of chancres, the *soft* and *hard,* originating from the same source. 3. *The present period,* in which it is held that, exclusive of gonorrhea, there are *two* other venereal diseases, viz., that which produces the soft chancre and that which causes hard chancres and syphilis.

The symptoms of syphilis are far less grave now than they were formerly. One reason assigned for this is that mercurial treatment was formerly continued till the full physiological effect was observed, thus aggravating the primary complaint. But others have contended that the principal reason is that the syphilitic organism does not now find so suitable a nidus or soil for its growth and development as it once did. It is held that, at least in Great Britain, syphilis is now in the stage of an epidemic in its decline. One might with at least equal reason postulate a general 'syphilization' (or protective inoculation with syphilitic virus) of the population (see SYPHILIZATION) by diffusion through generations. With what general impairment of vigor in the constitution of the race, or of any portion of it specially involved, such a process may be attended, is not known. For a long time attempts to find the parasitic microorganism, which analogy taught must be present as the causal agent in a contagious disease like syphilis, were unsuccessful. In 1905, however, Schandinn, in Germany, discovered a very minute animal parasite in the body of a syphilitic, which he believed to be the cause of the lesions of the disease.

SYRA, *sē'râ* (Gr. *Syros*): the most important, though not the largest, of that group of islands in the Ægean Sea known as the Cyclades (see ARCHIPELAGO: GREECE): 13 m. s. of Andros; about 10 m. long by 5 broad; 42½ sq. m. It is bare, hilly, and not very fertile. The products are wine, tobacco, grain, citrons, figs, honey, and vegetables; but the greater portion of the necessaries of life have to be imported. Its prosperity is quite modern. During the war of independence, S. remained neutral, and, in consequence, numerous fugitives flocked thither, under protection of the French flag, from other parts of Greece, especially from Chios and Psara, who, besides adding largely to the population, brought a spirit of political activity and commercial enterprise, whose beneficial effects are strikingly visible. The capital, *Syra* or *Hermopolis*, on a bay on the e. side of the island, rises terrace-wise from the shore, is well built, and is the seat of govt. for the Cyclades, and the residence of foreign consuls: pop. (1879) 4,398. It has numerous educational institutions, 4 printing-presses, 3 weekly newspapers. S. has become the great commercial entrepôt of the Ægean. Nearly one-half of all the imports of Greece reach it through this port. It builds more ships than any other town in the Levant, and owns one-third of all the Greek merchantmen. It has regular steam-communication with the principal trading-towns in the Levant.—Pop. of island, about 34,000.

Ancient notices of S. are scanty. Homer praises it in the *Odyssey* as 'rich in pastures, in herds, in wine, in wheat'; but it has no history.

SYRACUSE, *sĭr'a-kūs:* city, cap. of Onondaga co., N. Y.; on Onondaga Lake, and on the Delaware Lackawanna and Western, the New York Central and Hudson River, the Rome Watertown and Ogdensburg, and the West Shore railroads, and at intersection of the Erie and Oswego canals; nearly midway between Albany and Buffalo; 20 sq. m.; known as 'the Central City,' from its geographical location in the state, and as 'the Saline City.' It has a healthful, delightful climate, is well drained and sewered, and its extreme summer temperature has averaged 95° for many years, and extreme winter temperature—22°. The city has a new water-system, with its source of supply at Skaneateles Lake; there are over 160 m. of mains, and the cost of the equipment was $4,000,000. There are over 300 m. of streets and 60 m. of street railways. There are many public parks and public squares. Notable among the parks are Prospect, Comstock, Demong, Highland, Fayette, Foreman, and Billings.

Notable buildings in S. include the S. University, with 2,200 pupils and a library of 50,000 volumes; Federal building, town-hall, court-house, the Museum of Fine Arts, the Cathedrals of St. Paul and St. John, the County Orphan Asylum and Holden Observatory. There

are many large school houses, banks, wholesale and retail business structures. Every leading religious denomination is represented, several of the edifices being large and architecturally beautiful.

S. is the fourth city of the state in commercial importance, salt mining being a leading industry. The industries of S. include the manufacture of typewriting machines, iron and steel products, foundry and machine-shop products, tubing, automobiles, agriculture implements, steam-heating apparatus, electrical supplies, knitted goods, carriages and wagons and malted liquors. The industries yielding the largest products are, in order: clothing $3,000,000; chemicals $1,400,000; ales $1,400,000; pork and beef packing $1,250,000; carriages and wagons $1,100,000; salt $1,000,000; boots and shoes $1,000,000; flour and feed $1,000,000; cigars $650,000; steam-heating apparatus $600,000; frames and moldings $600,000. In 1900 the capital invested by 1,383 establishments was $31,385,055; number of wage-earners, 14,917; value of materials, $14,771,128; of products, $31,948,055.

The area of S. 1906, was 15 m.; net public debt, $7,395,600; assessed valuation, all taxable property, $87,114,221; tax rate, $1.72. Pop. (1880) 51,792; (1890) 88,143; (1900) 108,734; (1910) 137,249.

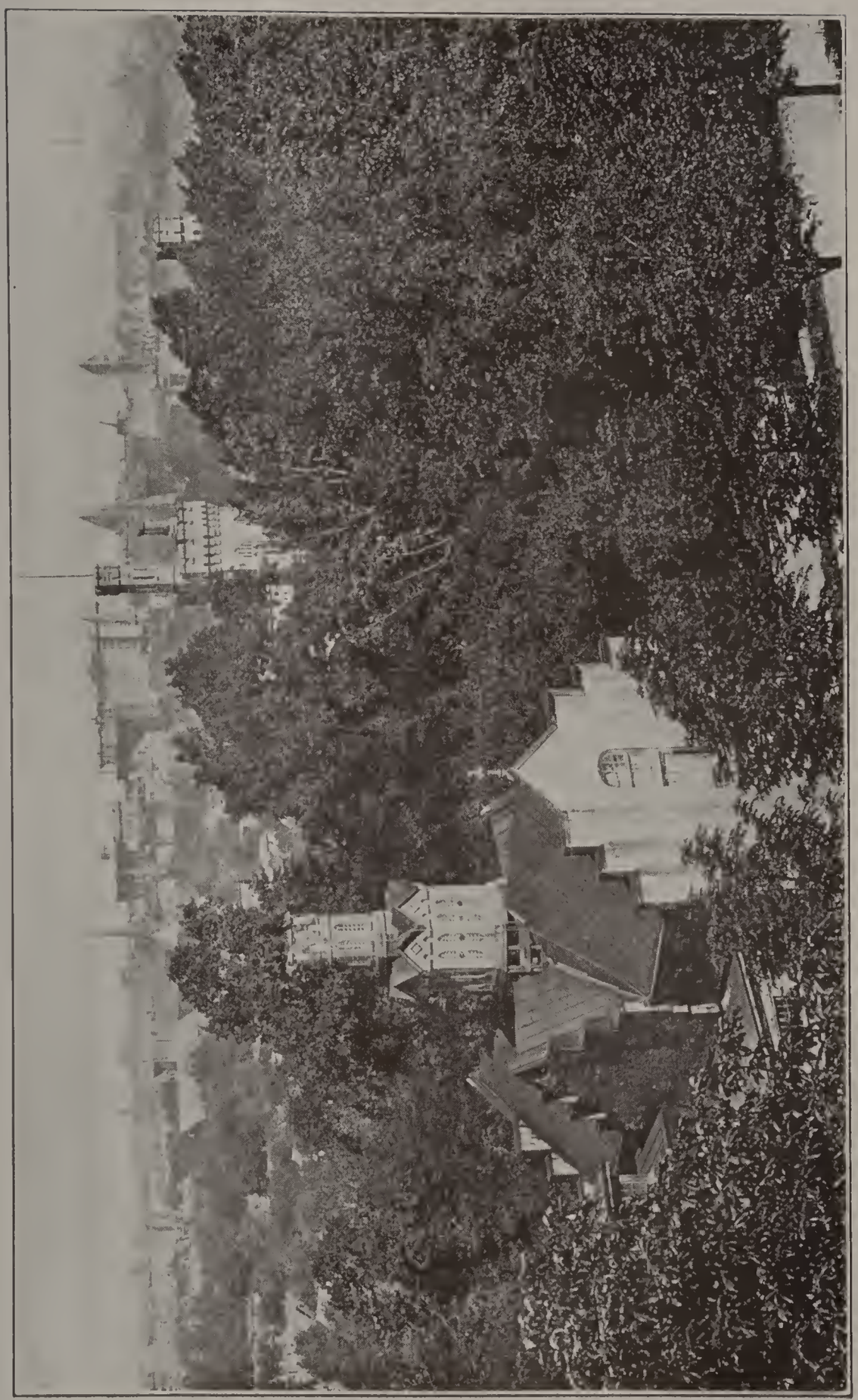
SYR'ACUSE: anciently the most famous and powerful city of Sicily (q.v.); on the s.e. coast of the island, 80 m. s.s.w. of Messina; one of the earliest Greek settlements in the island, founded by Corinthian settlers under Archias, one of the Bacchiadæ, B.C. 734. The original colonists seem at first to have occupied nothing more than the little isle of Ortygia, about one mile long and half a mile broad, near the shore. It rapidly rose to prosperity, and was enabled to establish sub-colonies of its own: Acræ B.C. 664, Casmenæ B.C. 644, and Camarina B.C. 599. Nothing definite is known of the early political state of S.; but before B.C. 486 the political power had passed into the hands of a few leading families, or perhaps *clans*, who constituted an oligarchy, while the great body of the citizens formed a malcontent democracy. In that year a revolution took place. The oligarchic families—*Geomori* or *Gamori*, 'landowners;' probably descendants of the original colonists, like the patrician *gentes* of Rome— were expelled, and the sovereign power was transferred to th citizens at large. Before a year passed, however, Gelon (q.v.), 'despot' of Gela, had restored the exiles and made himself master of S. He was a great ruler, and under him the city increased in size and wealth. It is believed to have been in Gelon's time that the adjoining mainland was first built upon. The locality of the new settlers was the slopes and heights of Achradina, or the 'outer city,' a triangular tableland n. of the island of Ortygia, and subsequently connected with it by a mole. This ultimately became the most extensive and populous quarter of S.—contained the Agora, a temple of Zeus Olympios, the Prytaneum, with a

splendid statue of Sappho, the fine monuments to Timoleon and the elder Dionysius (q.v.), etc. Of the other two quarters of the city, the date of settlement is not known. These were Tyche—so called, according to Cicero, from an ancient temple of 'Fortune' there—occupying a plateau w. of Achradina; and Neapolis (New City), stretching along the s. slopes of the plateau, and overlooking the marshes of the Anapus and the 'Great Harbor,' a spacious and well-sheltered bay, about five m. in circumference. Neapolis became one of the finest parts of Syracuse. Here were the theatre, amphitheatre, and numerous temples, of which hardly a relic remains, except of the theatre. Ortygia contained the castle or citadel.

Reverting to an outline of the history of S.—a noticeable characteristic of the reign of Hiero (q.v.), successor of Gelon, is his cultivation of the fine arts, and his patronage of men of genius, as Æschylus, Pindar, etc. B.C. 466 the democracy again got the upper hand—Thrasybulus, a 'tyrant' of the baser sort, being expelled; and for 60 years under a free and popular government S. flourished more than ever before. During this period occurred its great struggle with Athens B.C. 415–414, in which it was victorious; and its renown at once spread over the whole Greek world. But a new power appeared on the stage—the Carthaginian, whose conquests in Sicily, toward the close of the 5th c., threatened the supremacy of S. Meanwhile, Dionysius (q.v.) restored the 'tyranny' as under Gelon, and during a reign of 38 years greatly increased the strength and importance of the city. He constructed the docks in the Greater and Lesser Harbors, and surrounded the city with fortifications. His fierce and victorious war with Carthage B.C. 397, raised the renown of S. still higher. The reigns of the younger Dionysius (q.v.) and of Dion were unsettled; but after restoration of public liberty by Timoleon B.C. 344, a brief season of tranquillity ensued, during which prosperity rapidly revived. Under Agathocles, however, the despotic form of government was again established B.C. 317, and continued with scarcely an interruption, till the conquest of the city by the Romans, B.C. 212, during the Hannibalic war—the ruler of S., Hieronymus, a rash and vain young man, having abandoned the prudent policy of his grandfather, Hiero (q.v.), broken the alliance with Rome, and joined the Carthaginians.

Under the Romans, S. slowly but steadily declined, though it remained the capital and the first city of Sicily. Captured, pillaged, and burned by the Saracens A.D. 878, it sunk into complete decay, and is at present confined to its original limits, Ortygia, which, however, is no longer an island, but a peninsula. The streets of the modern town are, with few exceptions, narrow and dirty. S. has a cathedral, a museum of classical antiquities discovered in S. and the neighborhood, a public library, with some curious MSS., numerous churches, monasteries, and nunneries; and has a trade chiefly with Malta in wine, oil, salt, and salt-fish. It has several remains of ancient and mediæval edifices, much visited by travellers.—Pop. (1892) 28,000.

SYRACUSE.



VIEW OF SYRACUSE FROM THE UNIVERSITY

SYR-DARIA, *sēr-dâr'ĭ-â* (YELLOW RIVER), or SIHÛN, *sĭ-hŏn'*—formerly JAXARTES, *jăks-âr'tēz:* river of Turkestan, rising in the high plateau s. of Lake Issikul, in the Thian Shan Mts. It flows w. through the valley of Khokan, receiving numerous accessions; after passing Otrar, it divides into two branches; the largest and most northerly retaining the name Syr-Daria, flows w.-by-n., separating the Russian territory from the steppes of Turkestan, and, after a course of 1,150 m., falls into the Sea of Aral; the smaller branch, Kuvan-Daria, flows w., supplying some small lakes in the line of its old channel, but for several years has not reached the Sea of Aral, though 60 years ago it had greater volume of water than the Syr-Daria.

SYREN: see SIREN.

SYRIA, *sĭr'ĭ-a* (Ar. *E'sham,* Turk. *Soristan*): division of Asiatic Turkey, bounded n. by portions of Asia Minor, w. by the Levant, s. by Arabia Petræa; on the e. and s.e. its boundary is rendered indefinite by the sands of the desert, but at length becomes fixed by the course of the Euphrates. It extends about 380 m. along the Mediterranean coast, and on the e. it insensibly merges into Arabia: about 115,144 sq. m. Population more than 3,000,000. S. is divided into several governments, which frequently change their limits: they are usually named after the principal towns—Aleppo, Damascus, and Beyrout. The whole region is traversed by a double mountain-chain—of which Lebanon (q.v.) forms the highest part—touching in its n. extremities the Alma Dagh (anc. *Mons Amanus*), and in its s. forming the Sinaitic range. The central part of this mountain-system, which in many places exhibits the characteristics of a plateau, presents on the w. a steep front toward the Mediterranean, but on the e. rolls gradually away into the level uplands of the Syrian wilderness. The most noticeable features of the long *furrow* between the double ridge, beginning at its s. end, the Gulf of Akaba, are, the waterless wady of Arabah, the narrow, deep-sunken region known as *El Ghur*, through which the river Jordan flows and which embraces the Dead Sea and the Sea of Galilee, and the vale of Cœle-Syria (q.v.), and its great continuation northward, watered by the Nahr-el-Asy (anc. *Orontes*). The w. ridge is broken through in three places; in the n. by the lower Orontes; in the middle near Tripolis—where the chain of Lebanon properly terminates—and further s. near Tyre, by the Leontes. South of Tyre, it recommences in the hill-country of w. Palestine (q.v.), which finally passes into the desert plateau of El Tyh, in the Sinaitic peninsula. The e. ridge is less sharply defined; its most conspicuous elevations being Anti-Libanus (see LEBANON, MOUNT), the mountains of Moab (e. of the Dead Sea), and Mt. Seir, overlooking the wady Arabah. The principal rivers are the Orontes (q.v.), the Leontes, the Jordan (q.v.), the Barada or Abana, the river of Damascus. The only notable lakes are the Dead Sea (q.v.) and the Sea of Galilee (see GENNESARET).

Although S. belongs to the countries comprised within the Asiatic rain-zone, yet in general the climate is exces-

sively dry and hot, differing little from that of Arabia. Drought and scantiness of vegetation characterize almost equally the uplands and the valleys. Only where the mountains are lofty, the streams abundant, and the atmosphere somewhat maritime, as in the terraced slopes of Lebanon, do we find some approach to tropical luxuriance in flower, and fruit, and tree. Forests of evergreens, beautiful grassy pastures, and meadow-tracts are found there; and wheat, maize, rice, etc., are largely produced. The cultivation of the vine, the cotton-tree, the mulberry, and the finer sorts of fruits, as the olive and fig, is considerable; and indigo and sugar-cane are raised in the valleys of the Jordan and the region about the Dead Sea. The fauna of S., like its climate and vegetation, is similar to that of Arabia. The camel is of almost as much importance as further south; and the Syrian deserts, particularly toward the n., are the home of gazelles, hyenas, jackals, bears, buffaloes, and other wild animals.

The greater part of the Syrian mountains is limestone; mountain limestone in Lebanon, chalk in Anti-Libanus, and Jura limestone in Palestine. In the last of these, volcanic formations occur, especially in the region of the Jordan and the Dead Sea, where hot springs, beds of bitumen and sulphur, the shapes of the hills, and the frequent earthquakes, give evidence of volcanic activity. Salt is the only important mineral, and is exported in considerable quantities; coal, however, is worked near Beirût. Sheep, goats, with hanging ears and silky hair, cattle mules, and asses, form, as in ancient times, a great part of the wealth of the inhabitants.

Silk is the chief article of manufacture—at Aleppo, Beirût, Damascus, etc.; but cotton and woolen fabrics, gold and silver thread-stuffs, glass, earthenware, leather, soap, etc., also are manufactured. Lack of roads is a great hindrance to industrial activity. The first carriage road was opened 1863, between Beirût and Damascus. The other roads, except one or two short carriage-ways in Mt. Lebanon, are mere mule and camel tracks.

The *religious* sects are numerous. Most of the people are Mohammedans; but Christians of the Greek Church number 180,000; Maronites (q.v.) and Roman Catholics, 310,000; Jews, 40,000; Druses (q.v.), 90,000; lesser sects, about 30,000. The inhabitants are in some sense a mixed people, for the country has experienced many political vicissitudes; but by far the greatest number, whether Christians or Mohammedans, are of Shemitic origin, either Phœnician, Aramæan, or Arabic. Their Turkish rulers, however, and such Turkomans and Kurds as are settled in the north of S., belong to the Turanian race. Arabic is everywhere spoken, and may be considered the national language, since the old Syriac (q.v.) or Aramaic tongue is wholly dead, except among the Nestorians of Kurdistan.

The *history* of S. stretches back into remote antiquity. In the time of Abraham (conjecturally, in lack of historical chronology, about B.C. 2000) Damascus was a city; in the oldest literature of Greece, Sidon figures as the capital

of a rich, populous, and civilized state; and in the Hebrew Scriptures, Canaan or Palestine had numerous towns at the period of its conquest by Joshua; but, like most other so-called nations in early times, S. did not form a single state; it was rather a congeries of independent states whose inhabitants belonged to the same race Every important city had its king, whose normal occupation was fighting with his neighbors.—*Canaan*, the land later called Palestine, was, at the time of the Israelitish conquest, inhabited by a population of kin to the Phœnicians, the *Canaanites*, a name that appears to have been applied originally to the inhabitants of the coast only. The language of th Canaanites was like the Hebrew. The political geography of Canaan is involved in confusion, hence it is extremely difficult to fix the distribution of the tribes. The Amorites, occupying the s. portion of Canaan as also the n. part of the country beyond Jordan, were the most powerful of the Canaanite peoples. Of the other tribes, the Girgashites, Hivites, and Perizzites inhabited the centre of the country; the Jebusites dwelt near Jerusalem; in the s.w. were the Philistines (q.v.). The Hittites (q.v.) dwelt beyond the borders of Canaan. The Moabites, Ammonites, and Edomites inhabited a district in the s. of the country beyond Jordan, thus not within Canaan: these three tribes were nomadic.—Modern research has developed proofs of kinship between the Canaanites and their supplanters, the people of Israel. Thus, many Canaanitish personal names, as Adonizedek, Melchizedek, Ornan, need no interpretation to one acquainted with Hebrew; and the names of Canaanitish towns as given in the Bible and in certain Egyptian inscriptions of the time of Thothmes III. are pure Hebrew.—The religion of the Canaanites centred in the worship of the god Baal and Asherah—the god of life and fruitfulness and his consort.—That the Canaanitish population was not exterminated by the Israelite conquerors, but was suffered to retain possession of many parts of the country, may be gathered from sundry passages of the Hebrew Scripture, e.g. Josh. xiii. 13, xv. 10, 63, xvii. 12; Judges i. 19–36; and biblical narratives of later date. In the Fellahîn of Palestine to-day many authors recognize descendants of the pagan inhabitants of Canaan. The peculiar superstitions of these Fellahîn or peasants betray no reminiscence of Hebrew religion, and are evidently survivals of some early form of worship. In this view Thomson (see *The Land and the Book*) coincides with regard to the religion or superstition of one of the modern sects of n. Syria, the Nuzarieh. Under David and Solomon something like political unity was achieved for a large portion of S.; yet it does not appear that these great rulers dispossessed of their territories the princes whom they subdued, but only made them tributary; and after their death affairs reverted to their previous condition. Rezin, a slave, then made himself master of Damascus, and extended the Damascene monarchy over all n. and central S.; but the conquests of Tiglath-Pileser resulted in its becoming a province of the Assyrian empire. Subsequently, the

whole land, including Palestine, became part of the successive empires of Babylonia, Media, Persia, and Macedonia. Then followed the dynasty of the Seleucidæ (q.v.). After their fall, S. passed into the hands of the Romans, who retained it, though not continuously—for on several occasions the Persian Sassanidæ (q.v.) wrested it from them—until the Arab conquest in the 7th c. after Christ. During the Crusades (q.v.) of the middle ages, several Christian principalities were established here, but endured for only a short period. S. then became a possession of the sultans of Egypt, in whose time it was frightfully devastated by the Mongols. In the 16th c., it was conquered by the Turks, and has ever since formed part of the Turkish empire.—See PALESTINE.

SYRIAC, a. *sĭr i-ăk:* of or relating to *Syria* or its language: N. the language of Syria. SYR'IACISM, n. *-ă-sĭzm*, a Syriac idiom or peculiarity. SYR'IAN, n. *-ăn*, a native of Syria: ADJ. pertaining to Syria.—*Syriac* is the language of Syria; specifically, a dialect of Aramaic which about the beginning of the Christian era was developed into a literary language in w. Mesopotamia. Its form and laws were first fixed definitively when, in the 2d c., the Bible was translated into it. This S. version (called Peshito [q.v.] or Peshitta) became the Bible of Aramean Christendom. The influence of Greek on the later development of S. is very apparent. A voluminous literature, mostly ecclesiastical, was produced in S. between the 3d and 7th c. In the eastern Roman empire, S. was after Greek the most important language of the oriental provinces. S. began to decay after the rise of Mohammedanism, and as a means of communication between peoples speaking diverse tongues it gave place to Arabic. It is still used for literary and ecclesiastical purposes, but has long been a dead language. See SEMITIC LANGUAGES.

SYR'IAC VER'SIONS: versions of the Old. Test., current among the Syrian Christians. Besides the Peshito (q.v.), there were other Syriac versions. These did not acquire canonicity, and were chiefly translated from the LXX; the best known is one drawn up from the text of the Hexapla (q.v.; compare also ORIGEN), which it follows slavishly, without regard for Syriac idiom or grammar. It contains the critical marks of Origen and is moreover furnished with numerous variants, fragments from other Greek versions, and exegetical scholia. Bp. Paulus of Tela is supposed to have composed it at the instigation of Bp. Athanasius, 617. There are now only a few (imperfect) MSS. extant of it—one in Paris, one in the Ambrosian Library, a third has disappeared, and further portions are found in the Nitrian collection in the Brit. Museum. The greater part of the biblical books has been edited from it, but in separate publications. A complete edition is still a desideratum. A more complete edition of the Hexapla itself has been attempted by a reconstruction of lost portions of the Greek, through the medium of the parallel Syriac passages preserved in this translation.—Two other MSS. in the Paris Library contain fragments of another

Graeco-Syriac version, by Jacob, Bp. of Edessa, who, 703,4 composed it from the Peshito and the above translation—i.e., made a new recension of Paulus of Tela's work, corrected after the Peshito.

SYRIAN JAC'OBITES: see JACOBITE CHURCH.

SYRIAN RITE, CHURCH OF: that portion of the oriental church which had its seat in Syria, and which was anciently comprehended in the patriarchate of Antioch, and (after that of Jerusalem obtained a distinct jurisdiction) in the patriarchate of Jerusalem. The Syrian Church of the early centuries was exceedingly flourishing. Before the end of the 4th c., it numbered 119 distinct sees, with a Christian pop. of several millions. The first blow to its prosperity was the fatal division which arose from the controversies on the incarnation: see MONOPHYSITES: NESTORIANS: EUTYCHES. The Eutychian heresy, in one or other of its forms, obtained wide extension in Syria; and the usual results of division ensued in the corruption and decay of spiritual religion. The Moslem conquest accelerated the ruin thus begun; and from the 7th c. onward, this flourishing church declined into a weak and spiritless community, whose chief seat was in the mountains, and whose best security from oppression lay in the belief on the part of the conquerors of their utterly fallen and contemptible condition. For the most remarkable incident in the later history of the Syrian Church, see MARONITES. This branch of the eastern Christianity, though for the most part divided from the orthodox Greek Church by the profession of monophytism, took part with the Greeks in their separation from the west, under Michael Cerularius; and the reunion of the Maronites to Rome had the remarkable result of establishing side by side, within the narrow limits occupied by the Christians under Moslem rule in Syria two distinct communities, speaking the same language, using the same liturgy, and following the same rites; and yet subject to two different patriarchs, and mutually regarding each other as heretics and apostates from the ancient creed of their country.

The chief peculiarity of the Syrian rite, as distinguished from the Greek, consists in its liturgy, and the language of that liturgy, which is Syriac, and with which the people, and in many cases the priests, are entirely unacquainted. The liturgy is known as the Liturgy of St. James. The Syrians agree with the Greeks in the use of leavened bread, in administering communion in both kinds, in permitting the marriage of priests (provided they marry before ordination), and in administering the unction of confirmation at the same time with baptism, even to infants.

The Christian community of Syria may at present be divided into four classes: the Maronites (q.v.), the Greeks (called also Melchites—q.v.), the Monophysites, called Jacobites (see JACOBITE CHURCH), and the primitive Syrian Christians (not Maronites), in communion with Rome. This last-named community forms the small remnant of the ancient Syrian Church, which remained orthodox dur-

ing the controversy on the Incarnation, at the time of the general lapse into Monophysitism. To these are to be added the Christians of the Latin rite and a few Protestants. The Maronites number about 160,000; the Greeks are said to be about 180,000; the Jacobites of Syria and of Armenia Proper are said to reckon together about 40,000 families, of which, however, probably scarcely 10,000 can be assigned to the Syrian Church. The non-Maronite Syrians who follow their national rite, but are in communion with Rome, are supposed to amount to about 5,000. The resident Latins are chiefly members of the religious orders who from immemorial time have possessed convents in the Holy Land, and European Rom. Catholics who have settled permanently, or for a time, at Jerusalem Beirût, and Damascus. None of these belong in any sense to the Syrian Church. The belief, and in most particulars the disciplinary practice, of these several classes coincide substantially with those respectively of the same communities in the other churches of the East. All (except the Maronites and the few United Syrians) reject the supremacy of the Roman see. The Syrians of the Greek communion reject the double procession of the Holy Ghost (see FILIOQUE), and the Jacobites firmly maintain their old tenet of Eutychianism. Among them all are found monks and 'religious' women. All enforce celibacy on their bishops, and refuse to priests the liberty of a second marriage, or of marrying after ordination. The practice of fasting prevails among all alike. They practice invocation of saints, prayers for the dead, and the use of painted, though not of graven, images. Many particulars regarding them are in the memoirs of recent missionaries of the several denominations—particularly letters published by the French Soc. for Propagation of the Faith.—For the modern Nestorians, and the Syrian Christians of Travancore, see NESTORIANS.

SYRINGA, n. *sĭ-rĭng'gă* [Gr. *suringx*, a pipe]: genus of plants of which the lilac is the type, belonging to the Olive family (*Oleaceæ*); but the name S. is popularly applied in the United States to the Mock-orange (*Philadelphus coronarius*, q.v.), of another family, *Saxifragaceæ*, with cream-colored, very odorous flowers; also to the scentless *Philadelphus inodorus*, var. *grandiflorus;* both natives of mountains of Va. and south, and both cultivated. SYRINGINE, n. *sĭr-ĭn'jĭn*, bitter principle obtained from the leaves of the lilac. SYR'INGOT'OMY, n. *-gŏt'ō-mĭ* [Gr. *tŏmē*, a cutting], in *anat.*, operation of cutting for fistula.

SYRINGE, n. *sĭr'ĭnj* [Gr. *suringx*, a pipe or tube], hydraulic instrument, familiarly called a squirt, consisting of a cylinder of metal or glass, having at one end a conical nozzle, and the other end fitted with an air-tight piston. The nozzle being inserted in a liquid, the retraction of the piston draws the liquid into the cylinder, on the principle of the Pump (q.v.), and by its forward pressure the liquid is expelled in a jet from the nozzle. Syringes for use in injections are now commonly constructed in the form of two india-rubber tubes, with a hollow bulb or ball of india-

rubber communicating by valved openings with the exit tube and with the inlet tube or pipe immersed in the fluid—the valves opening in contrary directions, so that when the bulb is compressed the valve in the neck of the exit tube opens and that at the inlet pipe shuts, and *vice versa*. Syringes are constructed also on the principle of the siphon, and actuated by gravity: thus, in reservoir syringes, the supply of fluid is placed at some height above the point where the liquid is to issue, the two points being connected with a flexible tube. SYRINGE, v. to inject, wash, or clean with a syringe. SYR'INGING, imp. SYR'INGED, pp. *-ĭnjd.*

SYRRHAPTES, *sĭr-răp'tēz:* genus of birds of the Grouse family (*Tetraonidæ*), of which only one species is known (*S. Pallasii*), native of the deserts of Tartary, abundant in the neighborhood of Lake Baikal. From its peculiar characters, which led Pallas to call it *Tetrao paradoxus*, it has received the pedantic name of *Heteroclite Grouse.* The legs and toes are short, and densely feathered; the toes are joined together for most of their length. The bird walks with difficulty, but flies well, though usually only a short distance. The wings and tail are very long, terminating in remarkably long, slender, pointed plumes.

SYRTIS MAJOR, *sĭr'tĭs mā'jĕr*, AND SYRTIS MINOR, *mī'nĕr* [Syrtis from Ar. *sert*, desert]: ancient name of two gulfs of the Mediterranean Sea, on the n. coast of Africa. Syrtis Major (now *Gulf of Sidra*) is between Cape Mesurata, in Tripoli, and the table-lands of Barca, and forms the most s. part of the Mediterranean. Syrtis Minor (now *Gulf of Cabes*) is between Tunis and Tripoli. The shores of both are inhospitable, and abound in quicksands, which, carried by the wind, are said by the ancients to have frequently overwhelmed vessels, and the reports of modern travellers seem to some extent to confirm these traditions. Their waters are (or were) dangerous to sailors, on account of numerous shallows, sandbanks, and sunken rocks.

SYRUP, n. *sĭr'ŭp* [F. *sirop;* It. *siroppo;* Sp. *xarope*, sweet juice—from Ar. *sharáb*, wine or any beverage]: mixture of sugar or honey and water, flavored; especially, a medicated solution of sugar in water: juice of the sugar-cane; the liquid refuse of sugar, finer than molasses. *Syrup*, *sherbet*, and *shrub* all are derived from Ar. *srb;* Syrup through the Latin, Sherbet through the Persian, and Shrub through the Hindu. S., in its simplest meaning, is a saturated solution of sugar boiled to prevent fermentation; but it means also the juice of fruits saturated with sugar, and various flavored liquids treated in the same way. Generally the finest refined sugar is used; and effort is made to get the syrup clear and free from all feculent matter. Syrups of fruits are much used on the European continent to mingle with water for drink, and are very wholesome. SYR'UPED a. *-ŭpt*, moistened with sugar or honey. SYR'UPY, a. *-ŭp-ĭ*, resembling syrup, sweet.

SYSTEM, n. *sĭs'tĕm* [Gr. *sustēma,* an assemblage of many things put together—from *sun,* together; *histēmi,* I place or set: F. *système*]: a combination of things acting together; an assemblage of things arranged in regular order; a plan or scheme in which many things or parts are reduced to regular order and dependence; regular method or order. SYSTEMATIC, a. *sĭs'tĕm-ăt'ĭk,* or SYS'TEMAT'ICAL, a. *-ĭ-kăl,* formed or done according to system; proceeding according to a regular plan or method; methodical. SYS'TEMAT'ICALLY, ad. *-lĭ.* SYSTEMATIZE, v. *sĭs'tĕm-ă-tīz,* to reduce to a system or method. SYS'TEMATIZING, imp. SYS'TEMATIZED, pp. *-tīzd.* SYS'TEMATIZA'TION, n. *-tĭ-zā'shŭn,* the act of reducing to a system. SYS'TEMATI'ZER, n. *-zĕr,* or SYS'TEMATIST, n. *-tĭst,* one who reduces to a system. SYSTEMIC, a. *sĭs-tĕm'ĭk,* in *med.,* belonging to the body as a whole; common to a general system. SYSTEMIZE, v. *sĭs'tĕm-īz,* same as SYSTEMATIZE. SYS'TEMLESS, a. *-lĕs,* without system.

SYSTOLE, n. *sĭs'tō-lē* [Gr. *sustŏlē,* a drawing together —from *sun,* together; *stellō,* I send]: in *gram.,* the shorteningof a long syllable; in *med.,* the contraction of the heart and arteries for expelling the blood and carrying on the circulation (see CIRCULATION—*Physiology*). SYSTOLIC, a. *sĭs-tŏl'ĭk,* pertaining to systole; contracting.

SYSTYLE, a. *sĭs'tīl* [Gr. *sun,* together; *stulos,* a column]: in *classic arch.,* having the arrangement of columns in such a manner that they are two diameters of a column apart; having a row of columns set close together, as in the Parthenon at Athens.

SYTHE and SITHE, n. *sīth:* other spellings of SCYTHE, which see.

SYZYGY, n. *sĭz'ĭ-jĭ,* SYZ'YGIES, n. plu. *-jĭz* [Gr. *suzŭgĭa,* a yoking together—from *sun,* together; *zugon,* a yoke; *zeugnumi,* I join]: the point at which the moon or a planet is in conjunction or opposition with the sun; the times of both new and full moon: in *Greek and Latin verse,* the coupling of different feet together. SYZYGY'TIDE, the tide which takes place on the afternoon of the day the sun and moon are in syzygy.

SZAB'ADKA. See THERESIOPEL.

SZE-CHUAN: China; the largest province of the kingdom, in the w., with Tibet on the n.w. and Yun-nan on the s.w.; area 218,480 sq.m. It is traversed and watered by the Yang-tse-Kiang and its affluents, is hilly throughout, mountainous in the w., and rich in natural products, including coal, iron, and other minerals. Opium, silk, salt, sugar, medicines, tobacco, hides, musk, rhubarb, and white wax (produced by an insect) are exported to the annual value of $25,000,000; and European cottons and woolens are imported to the value of $15,000,000 annually. The capital is Cheng-tu, the chief commercial town Shung-king, which was opened to foreign trade in

the end of 1889. Ichang was thrown open in 1877. Pop. of province 68,724,890.

SZE-MA KWANG, *sĕ'mâ'kwang':* Chinese statesman and author: b. 1009; d. 1086. He is renowned as the author of *The Comprehensive Mirror of History,* in 294 books, the labor of 19 years. It covers a period from the beginning of the 4th c. B.C. to A.D. 960.

SZE-MA TS'IEN, *sĕ'mâ'chĕn':* Chinese author: b. 163 B.C.; d. 90 B.C. In 110 B.C. he succeeded his father, Sze-ma T'an, as grand recorder and astronomer, and took up the historical work begun by him. It was finished in 91 B.C., and was named *Shihki,* or *Historical Records.* It covers the period from 2697 to 104 B.C. He is also noted for reforming the calendar. The chronology settled on by him still prevails in China.

SZEBEN, *sĕ'bĕn,* NAGY, *nŏd'y,* or HERMANNSTADT, *hĕr'mân-stât,* Hungary: the capital of a county of the same name in Transylvania, near the Rumanian boundary. It lies amid beautiful surroundings, among which there are several noted health resorts. The city, which is built partly on a hill, partly on a small river-plain, has handsome, well-paved streets and a large market place. Among the principal buildings are a large Gothic church dating from the 13th to the 16th c. and now used by a Lutheran congregation, the city hall, the Franz Joseph communal hospital, several large barracks, and the palace of Bruckenthal containing a library and collections of art and antiquities. There are five institutions for higher education in the city, besides a cadet school, trade schools and a number of minor schools. The principal industries are the manufacture of cloth and blankets, soap, spirits, glue, and horn articles, and there are many machine shops, tanneries, and two large breweries. The inhabitants are chiefly German Protestants. The formerly important trade with the East has declined. Nagy Szeben was the capital of Transylvania, and from the 15th to the 17th c. was very strongly fortified. Pop. (1900) 29,577.

SZEGEDIN, *sĕg'ĕd-ēn:* Hungary; capital of the county of Csongrad, on the Theiss, 100 m. s.e. of Budapest. It lies in a marshy district. It has suffered the ravages of flood and fire, and is now modern in construction and buildings. Its public buildings are prepossessing, and include municipal buildings, courts, barracks, theatre, etc. There is a fine quay and embankment affording protection against further inundations. The river is spanned by fine bridges for railway and general traffic. The manufactures are soap, liquor, soda, tobacco, coarse cloth, etc. There is an important trade in wood, corn, wool, cattle, salt and tobacco. Many river boats are built in the yards of Szegedin. Pop. (1900) 102,991.

T

T, or t: 20th letter in the English alphabet, a consonant, the sharp or mute of the lingual series, *t, d, th* (*dh*); usually classed also as a dental. It is produced by pressing the forepart of the tongue against the front of the palate. The name in Semitic (*Tau*) signifies a mark (in the form of a cross). The Semitic tongues had another *t*-sound, which became the Greek *θ* (*th*). This aspirated *t* is lacking in Latin and its derivatives; it is also foreign to High German, though the Gothic and other Low-German tongues (English) possess it: the Gothic *th* has become in High German *d*. In the *spelling* of High German, *th* occurs frequently; but it is never pronounced, and the introduction of it being considered by students of the language an aberration, there is a tendency to drop the *h*. There is evidence that in Latin, at an early period, *t* before *i* was sibilated so as to sound like *ts* or *z* (see letter C). Before *s, t* was frequently dropped; as *fons* for *fonts, sors* for *sorts*. Final *t* was in Latin pronounced but faintly, and inscriptions show that in popular speech it was often dropped; e.g., *fece* for *fecit, vixse* for *vixit*. Thus the modern Romanic languages have inherited from their common mother the loss of the pronominal ending *t*. In French, *t* between two vowels has been elided; e.g., *père, mère,* from *pater, mater*. In the corresponding words of the allied languages, *t* is often interchanged with other letters. T in Sanskrit, Greek, and Latin becomes *th* in Gothic and English, and *d* in High German; thus Lat. *tres* (Skr. *trayas*), Goth. *thrais,* Eng. *three,* Ger. *drei;* Lat. *tectum* (Gr. *tegos*), Goth. *thak,* Eng. *thatch* or *thack,* Ger. *dach;* Lat. *frater,* Goth. *brothar,* Eng. *brother,* Ger. *bruder*. In German, the *t* of the English is often represented by *z*, as Eng. *two* = Ger. *zwei;* Eng. *toll* = Ger. *zoll;* while German *t* or *th* becomes Eng. *d,* as Ger. *tag, thau* = Eng. *day, dew*. A more remarkable interchange is seen in Lat. *lacrima* = Eng. *tear*. See PHILOLOGY.

TAAFFE, *tâ'fĕ,* EDUARD FRANCIS JOSEPH VON: Austrian statesman: b. Prague 1833, Feb. 24; d. Ellischau 1895, Nov. 29. He was of Irish descent; was educated at the University of Vienna, and entered the civil service. Promotion followed rapidly and in 1867 he became minister of the interior. In the following year he also served as acting minister-president. He had entered politics as a German liberal, but manifested a growing tendency toward federalism, which he regarded as the only means

of reconciling warring factions. In 1870 he joined with two of his colleagues in urging upon the emperor a policy in the direction of federalism with autonomy, but being defeated in this endeavor, he resigned. In 1871 he became governor of Tyrol and Vorarlberg. In 1879 he was again made minister of the interior, formed a new cabinet, and remained at its head until 1893. Devotion to the cause of the emperor was Taaffe's strongest trait, and as this involved the consolidation of the antipathetic nationalities of Austria, he bent every effort in that direction. He worked not through one party, but with any party which by opportune measures could be brought to support his policy; and he relied mainly upon private efforts, for in public he was an inferior speaker. In 1893 he was defeated in his purpose to extend the franchise, and his retirement from public life directly followed.

TAAL, Philippines: pueblo, province of Batangas, Luzon; on Balayán bay at the mouth of the Pansipit river; 13 m. n.w. of Batangas. It is connected with Batangas and other towns by highway, has a well sheltered anchorage, and carries on an important coastwise trade. Agriculture, stock-raising, and fishing are also important industries of which Taal is the centre; and sulphur deposits are found in the vicinity. The town is well built on a terraced hill, is an important military station, and one of the largest municipalities in the province. It has good schools. Pop. 33,380.

TAAL, Philippines: a volcano on Bombon Island in Lake Bombon or Taal, province of Batangas, Luzon. The island from which it rises is 14 m. in circumference; its greatest height is to the s.w., 1,067 ft. above the level of the lake; from this point it descends, and then rises to a height of 780 ft. to the n. The crater is oval and the walls steep; at the base are two steaming lagunas. It supplies large quantities of sulphur. The last eruption recorded took place in 1873; eruptions also occurred in 1709, 1715, 1716, 1731, 1747, 1754, and 1808.

TAB, n. *tăb* [etym. doubt.]: latchet or flap of a shoe or half-boot, formerly fastened with a buckle, now usually by a string: the metallic binding on the end of a shoe or corset lace; a tag: a lace or other border, resembling that of a cap, worn on the inner front edges of ladies' bonnets: the hanging sleeve of a child's garment; in *fulling*, one of the revolving arms which lift the beaters of a fulling-machine.

TABACO: pueblo, province of Albay, Luzon, on Tabaco bay, e. coast; 15 m. n. of Albay, the provincial capital. It has the deepest and best sheltered harbor in the province, and carries on a large trade with Manila, being third port in Albay in the importance of its shipping. Pop. 18,000.

TABARD, n. *tăb'ĕrd* [F. *tabard;* Sp. and Port. *tabardo;* It. *tabarro*, a wide loose overcoat]: garment in general use in the latter half of the 15th and beginning

of the 16th century, which succeeded the *Jupon* and *Cyclas*. It was a tunic, fitting closely to the body; was open at the sides, had wide sleeves or flaps reaching to the elbow, and displayed the armorial ensigns of the wearer on the back and front, as well as on the sleeves. It was worn sometimes over armor. About the middle of the 16th century, the tabard ceased to be used except by the officers at arms. TAB'ARDER, n. *-dĕr*, one who wears a tabard.

TABARET, n. *tăb'ă-rĕt* [see TABBY]: a material for furniture purposes resembling tabbinet, but having broad stripes of satin between broad stripes of watered material.

TABARI, *tâ-bâ'rē*, ABU JAFAR MOHAMMED IBN DJERIR: Mohammedan theologian and historian: b. Amul, Taberistan, 839; d. Bagdad 923. During the first half of his life he widened the area of his learning and experience by traveling from one centre to another of Moslem religion and speculation between eastern Persia and Egypt, devoting himself to the perusal of the Koran, and the acquisition of all the lore which jurisprudence, tradition, history, and philology had contributed to the elucidation of the Mohammedan scriptures. In about 881 he settled at Bagdad and employed the fruits of his investigation as a teacher and writer. His principal works are the *Tefsir* or *Exegesis*, which contains a complete collection of the existing and independent commentaries of all interpreters of the Koran, with large additions, original and compiled, from abstruse sources. It filled 25 large manuscript volumes and was published in 35 numbers of the *Zeitschrift der Deutschen Morgenländischen Gesellschaft* (1881). His other work is somewhat less important, being a history of the world (*Annals*) from creation to 914 A.D.

TABASCO, Mexico: a state situated at the head of the Gulf of Campeachy, and bounded by the states of Vera Cruz, Chiapas, and Campeche. It is one of the smallest states of the confederation, its area being 10,072 sq.m. The surface consists almost entirely of a great flat, sloping gradually to the sea, but in many parts so low that it is subject to inundations. The streams, though numerous, are short and shallow, and are generally obstructed at their mouths by bars and flats. The climate is excessively hot, particularly along the coast, and in the marshy districts very unhealthful. A large portion of the state is still covered with primeval forests. The principal cultivated crops, are cacao, coffee, dyewoods, vanilla, indigo, tobacco, and sugar. The inhabitants are chiefly Indians. The capital is San Juan Bautista. Pop. of the state (1900) 159,834.

TABASHEER': a remarkable substance occasionally found in the hollow joints of certain species of bamboo and other large grasses. It is ordinarily sought for by splitting open those bamboo stems which give a rattling

sound when shaken. It is especially apt to be found in the *Bambusa arundinacea* of India and other related species of Japan, China, Java, and the Andes Mountains. During the rapid growth of the bamboo shoots, their solid joints become hollow and are partially filled with water containing silica in solution. The development of the foliage leads to active transpiration; the water absorbed from the soil quickly disappears and tabasheer is the residue. It is at first jelly-like, but gradually solidifies into small milky-white masses. Physically and chemically these are practically identical with the hydrophane variety of the mineral opal. It is an open question, however, whether tabasheer should be regarded as belonging to the mineral or the vegetable kingdom. It is essentially a hydrous silica, the lime and potash which are often present being doubtless simply impurities. Its optical properties are most remarkable. According to Brewster, it has a lower index of refraction than any other solid or liquid, its refractive power being not only lower than water, but so much lower as to be almost intermediate between water and air. The material is isotropic, opalescent, and remarkably phosphorescent. It becomes transparent when saturated with water, and is remarkably porous. It probably possesses greater absorptive power than any other mineral, Brewster claiming that the pores occupy two and one-half times as much space as the silica itself, notwithstanding the fact that they are invisible even under very high powers of the microscope. From time immemorial it has been highly esteemed in the orient for its supposed medicinal properties. A knowledge of the substance was introduced into Europe by the Arabian physicians, and its name is of Arabic origin. Much so-called tabasheer in Turkey and Asia Minor is artificial.

TABB, John Banister: American poet: b. Amelia co., Va., 1845, Mar. 22. After private study, he was appointed in 1862 captain's clerk to the Confederate blockade-runner R. E. Lee, but in 1864 was captured and held prisoner for seven months at Point Lookout, Md. He studied music in Baltimore, taught there, and at Racine College, Michigan, and after courses at St. Charles College, Ellicott City, Md., and St. Mary's Seminary, Baltimore, was ordained in 1884 to the priesthood of the Roman Catholic church. Since that time he has been professor of English at St. Charles. He privately printed a book of *Poems* in 1884; and from that time wrote largely for the magazines, gathering his contributions at intervals in various collections. His volumes are: *Poems; Lyrics; An Octave to Mary; Rules of English Grammar; Poems Grave and Gay* (1899); and *Two Lyrics* (1900); *Quips and Quiddits* (1907). He is ingenious in matter, compact in form—his favorite length being the quatrain—and uses an effectively simple diction.

TABBINET, or TABINET, n. *tăb'bĭ-nĕt* [see TABBY], figured texture of a warp of silk and a weft of wool-yarn, like that in poplin; having the appearance of fine damask, and much used for window-curtains. It is usually enriched with diaper patterns.

TABBY, n. *tăb'bĭ* [F. *tabis;* Sp. *tabi;* mid. L. *attabi*—from Ar. *attabi*, a rich kind of watered silk, so called from a quarter of Bagdad, where first made]: old name for silk watered or figured (see MOIRE)—applied to worsteds rather than silks: mixture of lime, gravel, etc., and water forming a mass which, when dry, becomes very hard: a cat of a tabby color: an elderly married or unmarried lady: A. brindled with dark gray or black, like the waves of watered silk—applied to cats: V. to brindle; to cause to look wavy as watered silk. TAB'BYING, imp.: N. the passing of silk, etc., under a calender to give it a wavy appearance. TAB'BIED, pp. *-bĭd.*

TABERN, n. *tăb'ĕrn* [L. *taberna*, a tavern]: a cellar.

TABERNACLE, n. *tăb'ĕr-năk-l* [L. *tabernac'ulum*, a tent—from *taber'na*, a hut]: movable or temporary habitation: the movable structure carried by the Israelites during their wanderings in the wilderness as a place for worship and sacrifices (see below): a place of worship: figuratively, the natural body of man; in *Rom. Cath. Ch.*, an ornamental erection on the altar for reception of the consecrated wafer (see below): V. to abide for a time; to lodge; to enshrine. TAB'ERNACLED, a. *-năk'ld*, lodged. TAB'ERNAC'ULAR, a. *-năk'ū-lĕr*, pertaining to a tabernacle; in *arch.*, latticed. TAB'ERNAC'ULARLY, ad. *-lĭ.*

TAB'ERNACLE (Heb. *Ohel Moed* = tent of meeting, *scil.*, between God and man; LXX. *Skene*, Vulg. *Tabernaculum Fœderis*): the tent first erected by Moses in the desert as a portable sanctuary, the visible symbol of the Divine abiding in the midst of the people. It was the place where Moses went to receive his inspirations as their representative, when they 'came to seek Jehovah.' A cloudy pillar descended and stood at the door of the T., while 'Jehovah spake to Moses' (see Ex. xxv. seqq., xxxvi. seqq.). It was divided into the 'Sanctuary' proper—the front part, 20 cubits in length, 10 in width, and 10 in height—and the 'Holy of Holies,' 10 cubits square, and 10 high. A kind of court-yard, formed by curtains suspended between columns, surrounded the T., 100 cubits long, 50 wide. The entrance was toward the east—the rising of the sun—and was closed by another costly curtain, into which, as into the first covering, figures of 'cherubim' were woven. The surrounding court was much larger on this e. than on the w. side, for here the people assembled for worship. Here also stood the altar, of acacia-wood, with its perpetual fire, and the brazen laver. The *Sanctuary* contained the gilded table with the shewbread to the right, the golden candlestick with seven branches to the left; and between them the 'golden altar,' or 'altar of incense,' upon which the high-priest burned incense in the morning and evening. In the Holy of Holies, the holy ark, or Ark of the Covenant,

alone was kept: a chest of acacia-wood, plated with pure gold within and outside, containing the two tables of the Ten Commandments. On the top of it were the two cherubim facing each other; and between them was the symbolical presence of Jehovah (the Shechinah—q.v.).

Only once a year, on the Day of Atonement, the high-priest was allowed to enter the Holy of Holies; but the Sanctuary was the ordinary place of the priests, and the court that of the Levites. The tribe of Levi was also that to which was assigned the place nearest the T., around which the 12 tribes were grouped; also, the members of this tribe had the duty of conveying the structure from place to place during the migrations.

The T., after the people had settled in Canaan, was erected at Shiloh, where it was still found at the time of Saul, though the Ark of the Covenant itself had been carried away by the Philistines, in the time of Eli, and when restored, placed at Kirjath-jearim. The T. of Shiloh was not the only sanctuary, as it was intended to be. We find other local sanctuaries with priests—at Bethel, Nob, Sichem, Mizpah, etc.—at which even Samuel worshipped, as in legally instituted places. When David is reported to have removed the Ark from Kirjath-jearim to Jerusalem, nothing is said about the T. of Shiloh; on the contrary, David erected a new one on purpose for the Ark. It is conjectured that it had been removed to Gibeon.

TAB'ERNACLE, in the Roman Catholic Church: receptacle in which the consecrated elements of the Eucharist are retained. The name is derived by analogy from the T. of the Old Law, which, in general form, it resembles. By the present discipline, the T. is commonly a small structure of marble, metal, or wood, placed at the posterior part of the altar, and of costly workmanship. Even when the exterior is of marble or metal, there is usually an inner receptacle of wood (properly cedar), lined with silk. The tabernacle is appropriated exclusively to the reservation of the Eucharist, and it is prohibited to keep within it any other object, however sacred. A lamp is constantly kept burning before it; and the T. is to be kept carefully locked, the key being retained by the clergy, who are forbidden to intrust it to any lay person whomsoever.

TAB'ERNACLES, Feast of (Heb. *Succoth*, LXX. *Heorte skenon*, Vulg. *Feriæ Tabernaculorum*): Hebrew feast of seven days, beginning on the 15th day of the 7th month (Tishri, nearly corresponding with Oct.), instituted principally in memory of the nomad life of the people in the desert, and the booths or tents used on their march. Besides this signification, it also had an agricultural one, like the other two pilgrimage festivals, the Passah and the Feast of Weeks. It was emphatically the Feast of 'Ingathering'—i.e., the close of the labors of the field—the harvest of all the fruits, of the corn, the wine, and the oil. During this feast, the people were enjoined to dwell in booths, which, we learn from Neh. viii 15, were made of olive, pine, myrtle, palm, and other branches, and were erected on the roofs of houses, and in the courts and

streets. The scriptural injunction, to take trees and 'boughs of goodly branches of palm-trees,' etc., was by tradition explained to mean a bunch made of palm, myrtle, and willow branches, and the esog-fruit, a species of citron, which the faithful carried in procession during these seven days in the Temple; while those who did not visit the Temple only said a benediction over it on the first day. The Sadducees and Karaites, however, demurred to this explanation. Special sacrifices, and a greater number of burnt-offerings than on any other festival, were offered up on this; and on it also the law was to be read to the people every seventh year. It was called emphatically *the* festival, and was the most joyous of all. There was especially during the time of the Temple, the tumultuous 'joy of the libation,' consisting of the priest's fetching, during the morning sacrifice of each day, water from the well of Siloah, and pouring it out, with accompaniment of music and hymns. There was further a grand illumination in the evening in the court of women, which is said to have lighted up all Jerusalem; and during and after which there were dancing and singing. On each day the trumpets were sounded 21 times. At the end of the seven days' joy, an eighth day of solemn rest was celebrated, perfectly distinct from the other days in its sacrifices and in its general service; and a sin-offering was slaughtered—in expiation of possible transgressions during the previous hilarity.

Three distinct times was the inauguration of the Temple celebrated on this important festival, by Solomon, Ezra, and Judas Maccabæus; though the festival itself seems, from Neh. viii. 17, not to have been properly celebrated before the Exile. The observances of the booths and the harvest-bunches are still in force with the strict adherents of traditional Judaism, though the agricultural signification of the festival can be only a historical or poetical reminiscence. No festival could have been more apt to inculcate the fundamental principle of Judaism—the equality of all men—than this, which enjoined that every one should live for a time in primitive dwellings, without distinction of rank, station, or fortune, and should rejoice in the harvest, with the whole people of the land 'before Jehovah.'

TABERNÆMONTANA, n. *tăb'ĕr-nē-mŏn-tā'na* [after Dr. *Tabernæmontānus*, a great physician and botanist]: genus of interesting plants, ord. *Apocynăceæ*, bearing sweet scented flowers. TABERNÆMONTANA UTILIS, *ū'tĭl-ĭs* [L. *utĭlis*, profitable]: cow-tree or milk-tree of Demerara: see COW-TREE: FORBIDDEN FRUIT.

TABES, n. *tā'bēz* [L. *tābēs*, a wasting away—from *tābĕō*, I melt or waste away]: gradual wasting away of the whole body, accompanied by languor and depressed spirits, without any apparent disease of the viscera. TABETIC, a. *tă-bĕt'ĭk*, or TABET'ICAL, a. *-ĭ-kăl*, affected with tabes; wasting by slow disease. TABID, a. *tăb'ĭd* [L. *tabĭdus*, wasting away], wasted by disease. TAB'IDLY, ad. *-lĭ*. TAB'IDNESS, n., or TAB'ITUDE, n. *-ĭ-tūd*, state of being wasted by disease.

TABES DORSALIS, *tā'bēz dawr-sā'lĭs:* affection of the nervous system, also known as *locomotor ataxia.* For the distinctions between tabes dorsalis and *Paraplegia,* see PARALYSIS. The affection is characterized by a lack of power in harmonizing the action of certain muscles, the absence of such coördinating power being apparent first in the lower extremities, making the gait straggling and unsteady. There is no true paralysis, but sensitiveness is diminished, and neuralgic pains are felt in the legs and feet. The loss of power proceeds, and the later stages of the malady are marked by such symptoms as disordered vision, incontinence of urine, and exhaustion. The duration of this disease varies from a few months to several years. The *etiology* or *causes* of tabes dorsalis are obscure. A peculiar change in the posterior columns of the spinal cord, and in the posterior or sensory roots of the spinal nerves, accompanies it. Prolonged exposure to cold and damp, drunkenness, sexual excesses, masturbation, etc., have been regarded as causes. Many authorities believe that it is, in many instances, or even exclusively, a remote result of syphilis. It is alleged to be more common in men than in women, and subjects between the ages of 30 and 50 are said to be most liable to it. The patient has an unsteady gait, and walks like a drunken person, but soon recovers his bearing in some degree. A difficulty in carrying out the intents of the will is experienced, and in picking up an object one hand is employed to steady the other. When the eyes are shut, the patient walks with extreme difficulty. Tabes dorsalis may be distinguished from disease of the cerebellum by absence of the characteristic pain at the back of the head, and of vomiting. The progress of tabes dorsalis may be retarded, but the prospect of cure is nearly hopeless. The *treatment* is limited to improvement of the general health: warm clothing, nutritious food, and rest are the chief items; and opiates are indicated for relief of the neuralgic pains. Sulphur baths have been prescribed in the earlier stages, and constipation should be alleviated. Systematic and long continued training of the muscles, by means of appropriate exercises, so that the patient is able to execute voluntary movements with certitude and precision, is said to have been productive of good results.

TABES MESENTERICA: tuberculosis of the mesenteric glands in children, leading to marasmus and death.

TABLAS: the largest and most western island of Romblón province, 15 m. n. of the island of Panay; length n. and s., 40 m.; width, 13 m.; area, 320 sq.m. The island is mountainous; the highest peak, in the extreme n.e., has an elevation of 2,405 ft.; the coasts are mostly abrupt, on the w. coast are several good anchorages for small craft; Loog has the best harbor. There are no good roads, and few trails; communication between the towns, which are all on the coast, is by sea.

The chief industries are agriculture, stock-raising, and fishing; but these are almost entirely for domestic purposes. The island is heavily wooded, but lack of communication with the interior has prevented the development of the forest resources. Pop. 23,850.

TABLATURE, n. *tăb'lă-tūr* [F. *tablature,* arrangement of marks on a line (see TABLE)]: a painting or basso-rilievo on a wall or on a ceiling, forming a single piece comprehended in one view and formed according to one design; in *anat.,* a division or parting of the flat bones of the skull into two tables: a mode of writing music for the guitar and other instruments, now long disused.

TABLE, n. *tā'bl* [F. *table*—from L. *tabŭla,* a board]: piece of domestic furniture, consisting of a flat surface supported on one or more legs: a flat surface in general: persons sitting at table; the fare or entertainment itself: a circular sheet of finished glass: a collection of particulars, numbers, results, etc., arranged in order and brought into one view: in *arch.,* any smooth ornament usually that of a long square: the Ten Commandments, consisting of two tables; in *OE.,* that which exhibits a view of a thing on a flat surface; in *palmistry,* lines of the hand; in *plu.,* small pieces shifted on squares or points; draughts; backgammon: ADJ. pertaining to a table: V. to lay or place upon a table; to enter upon the record; to board, etc.; in *OE.,* to make into a catalogue; to set down; to supply with a table or food. TA'BLING, imp.: N. in *shipbuilding,* the letting of one piece of timber into another. TABLED, pp. *tā'bld.* THE LORD'S TABLE, the communion of the Lord's Supper; the Eucharist; also the table itself in the Eng. Chh. TABLE-BEER, weak beer for common use. TABLE-BOOK, book on which anything is impressed or written without ink; tablet. TABLE-CLOTH, covering of linen, etc., for a table, particularly at meals. TABLE-LAND, in *phys. geog.,* any flat or comparatively level tract of land considerably elevated above the general surface of a country; a plateau (see TABLE-LANDS). TABLE-LINEN, the linen used for and at the table. TABLE-MONEY, allowance granted to general officers in some European armies and navies, to enable them to fulfill the duties of hospitality proper to their station. TABLE-SPOON, the ordinary large spoon used at table. TABLE-TALK, familiar conversation at meals. TABLE-TURNING, movements of tables attributed to the power of departed spirits, or to the development of latent forces whether spiritual, vital, or material (see SPIRITUALISM). TO LAY ON THE TABLE, in parliamentary usage, and in the usage of corporate and other bodies, to receive any document or written communication, as a report, a motion, and the like, while agreeing to postpone its consideration indefinitely. TO SERVE TABLES, in *Scrip.,* to administer the alms of the church, a duty assigned to the deacons. TO TURN THE TABLES, to change the condition or fortunes of contending parties. TABLE

D'HÔTE, n. *tâ'bl dōt* [F., table of the landlord]: dinner for the whole company of guests together at a hotel or tavern—constructively with the landlord presiding; an ordinary. TWELVE TABLES, celebrated body of anc. Roman laws. TWO TABLES, two stone tablets on which the Ten Commandments were written, the first with four containing duties to God, the second with six containing duties to man. KNIGHTS OF THE ROUND TABLE, military order of the ancient British king Arthur (q.v.).—SYN. of 'table, n': tablet; index; catalogue; syllabus; synopsis.

TABLEAU, n. *tăb'lō*, TABLEAUX, n. plu. *tă-blō'* or *tăb'lōz* [F. *tableau*, a picture, a painting—from a supposed mid. L. *tabulellum*, a dim. of L. *tabŭla*, a table]: a striking and vivid representation. TABLEAUX VIVANTS, *tăb'lō vē'vâng* [F., living pictures; *vivants*, living]: an exhibition in which one or more persons in appropriate costume represent some interesting historical scene, or character in fiction, or some celebrated painting or statuary. They are said to have been invented by Madame de Genlis when she had charge of the education of the children of the Duke of Orleans. Some writers on æsthetics declare them opposed to just principles of taste.

TABLE-LAND, or PLATEAU: an elevated flat tract of country of considerable areal extent. In ordinary usage the term is applied to such flat areas elevated above 1,000 ft. from sea-level. The level character of the plateau may be due to the horizontality of the strata composing it, the surface being formed by a resistant stratum, or it may be due to subaerial or marine denudation of a flexed and folded mountain region, the erosion having proceeded so far as to reduce the region to a nearly level tract or peneplain, which is then elevated bodily. Any portion of the ancient mountain system not worn away will rise as a peak or mountain range above the peneplain surface, and constitute a *monadnock*. A plateau of this type—that is, an elevated peneplain—may be readily recognized by the disagreement of the slope of the strata composing it with the level surface of the peneplain, the two not infrequently making an angle of 90 degrees with each other. When a young plain of deposition with horizontal strata is elevated into a plateau, and the rivers begin to cut their channels down into it, it is in the beginning of its first geographical cycle. If it remains stationary at the altitude to which it was raised, the rivers will eventually incise their channels to such a depth that their bed from ocean to head is perfectly graded. Then lateral erosion will widen the valley bottoms, and reduce the portions of the plateau between the river valleys until finally these separating remnants of the plateau have dwindled to such an extent that they appear as ridges or peaks rising from a level plain, which latter is the result of the confluence of all the river valleys cut into the former plateau. This is the beginning of the peneplain stage, and continued erosion will bring the

surface nearer to a perfect plain practically at sea-level. If this is reached, the first cycle of geographic development is complete. The second cycle is inaugurated by a re-elevation of the land into a new plateau, when the whole process will be repeated. In like manner a folded mountain region may be worn down to a peneplain, and re-elevated to enter upon the next cycle of erosion. Most plateaus are probably elevated peneplains, either of horizontal strata or of more or less strongly folded and truncated strata. Into these the present drainage has incised itself more or less successfully. Thus the New England region is a peneplain plateau, of inclined strata, whose surface, moderately re-dissected by streams, slopes gently toward the coast. S. New York, w. Pennsylvania, Ohio, and other districts are part of a plateau in which the strata are nearly horizontal and which has been more or less strongly dissected. This extends s. into Tennessee where it is known as the Cumberland plateau. It is probably past its first cycle of erosion, and appears to have been a peneplain once.

Among other noteworthy plateaus of North America are: the 'High Plateaus' of s. Utah, which range in elevation from 7,000 to 9,500 ft. above the sea, their elevation being connected with that of the Wasatch range of mountains. Between the Rocky and Sierra mountains extends a broad plateau from Mexico n. through British America. It averages from 3,000 to 5,000 ft. in elevation, and is deeply dissected by the cañons of the Colorado, the Columbia, and other rivers. The portion included between the two rivers named is called the Great Basin. It is bounded on the e. by the Wasatch mountains, and on the w. by the Sierra Nevada and Cascade ranges, and has a width of nearly 500 m., with an elevation of 4,000 to 5,000 feet. It has no outside drainage, and hence the streams are short, and the water bodies saline. Great Salt lake and Mono lake in California are respectively on the e. and w. side of this plateau, and the surface between is arid and more or less desert. Similar conditions exist in the Mexican extension of this plateau. A similar type of table-land—to which the name intermont plateau has been applied—is found in the great plateau of Tibet between the Himalayas and the Kuen-lun mountains. Its altitude is about 13,000 ft., while the enclosing mountains rise from 25,000 to 29,000 ft. in height. It is 1,200 m. long from e. to w., and half as wide. The plateau of Quito is 10,000 ft. above sea-level and surrounded by lofty peaks rising 20,000 ft. or more. That of Bolivia has an elevation of 12,900 ft. with Lake Titicaca at 12,830 ft., and the city of Potosi at 13,330 ft. elevation.

Plateau of Spain averages 2,250 ft. in elevation, that of Auvergne, in France, about 1,100 ft. Bavaria is a plateau rising 1,660 ft., Persia is another from 2,000 to 4,000 ft. above the sea. The Abyssinian plateau in Af-

rica averages 7,000 ft. above the sea, while the Sahara region is about 1,500 ft. above sea-level. The table-land character of all these regions appears only in a general view. Owing to the dissection of the plateaus they appear as a rule anything but level to the traveler in them, unless a comprehensive view from a summit is obtained. Many of the larger plateaus are also traversed by mountain ridges.

TA'BLE MOUNTAIN, or TA'BLE MOUNT. See CAPE TOWN.

TA'BLES, LUNAR: tabular lists of the values of the elements of the moon's orbit, as planetary tables are lists of the elements of the planets' paths. Also the term is used occasionally to denote the tabulated angular distances of the moon from certain stars at fixed epochs, as given in the *Nautical Almanac* (q.v.). See LATITUDE.

TABLET, n. *tăb'lĕt* [F. *tablette,* a shelf, a dim. of F. *table* (see TABLE)]: a small flat surface of any material, anciently used for memoranda; something flat used for writing, painting, or drawing on; a small flattish cake, as of soap; a flat piece of sweetmeat; in *China,* a wooden or stone representation of the dead; an ancestral monument.

TABLE TURNING: in psychical phenomena. A number of persons form a circle round a table, on which their outstretched fingers lightly rest. After a time the table begins to move, and to answer questions either by tilting or rapping at appropriate letters as the alphabet is repeated. Faraday was of opinion that a rotary impulse was unconsciously imparted to the table by those who stood around it, and it has been pointed out that pushing may take place without any distinct consciousness on the part of those who push, and that expectant attention is known to produce such a state of the muscles as would occasion this unconscious pushing.

TABLI'NUM: in Roman antiquity, an apartment in a house in which were deposited the genealogical records and archives, and all documents commemorating the exploits which had been performed by members of the family, or which were connected with the high offices which any of them had filled.

TABOO, n. *tă-bô':* in the *Pacific Isles,* a system of religious prohibitions, applicable to all kinds of things, persons or actions (see below): V. to forbid the use of; to render inviolable; to forbid approach or use; to interdict. TABOO'ING, imp. TABOOED', pp. *-bôd.—Taboo.* or *Tabu,* or *Tapu, tă'pô',* or *Tambu, tăm-bô'* (in New Zealand, usually *Tapu',* is a Polynesian term, denoting an institution universal in the Polynesian Islands and in New Zealand. Its primary meanings seem exactly the same as those of the Hebrew *to'ēbah.* This word, like Gr. *anathema,* Latin *sacer,* and F. *sacre* (and similar terms in most other lan-

guages), has a double sense—a good and a bad; on the one hand, consecrated; on the other hand, accursed. It results from a thing being held sacred, that certain acts are forbidden with reference to it, and from any act being deemed abominable, that it is forbidden; a notion of prohibition thus attaches to the word T. The term is often used substantively in the sense of a prohibition, a prohibitory commandment. If a burial-ground has been consecrated, it is T.; to fight in it is then sacrilegious and prohibited, and this also is T.; moreover, those persons are T. who have violated its sanctity by fighting in it, and they are, loosely and popularly, said to have broken the T. This example illustrates all the uses of the word. It has furnished to the English language the now familiar phrase of being 'tabooed'=forbidden.

The extent to which, among the Polynesians and New Zealanders, things and acts are T. is almost incredible. The prohibitions divide into two classes: one, of traditional rules, acting through religious terror equally on chiefs and people; the other, of prohibitions imposed from time to time for maintaining the authority of the chiefs. Those of the first class are by far the most remarkable; and of these the most important are those bearing on sacred things, those relating to the person of the chief, and those relating to intercourse between relatives.

Any house or piece of ground consecrated to a god is T., and thus affords inviolable shelter to men fleeing from an enemy. *A fortiori*, all temples are T. To come in the way of a funeral procession is severely T., for it is believed that the gods accompany the procession. Again, to touch the person of a chief, is T. to his inferiors; also, to touch anything belonging to him, to eat in his presence, to eat anything he has touched, or to mention his name. The interdict on family intercourse varies in extent in different places. In the Tonga Islands, it was T. to mention the name of father, mother, father-in-law, mother-in-law; also to touch these relatives, to eat in their presence (unless with the back turned, when constructively the person was not in their presence), or to eat anything which they had touched. In the Fiji Islands, generally, it is T. for brother and sister, first-cousins, father-in-law and son-in law, mother-in-law and daughter-in-law, brother-in-law and sister-in-law, to speak together, or to eat from the same dish: husband and wife, too, are forbidden to eat from the same dish. In some places, a father may not speak to his son after he has passed his 15th year.

The traditional T. also supplies to some extent the place of laws and a police: in many places, exposed property of some kinds is always under its shelter.

The chiefs have large discretionary power of declaring articles or actions T.; indeed, their power is unlimited, but they are expected to keep within precedent. In many cases, they use it for public purposes—thus, when a feast is coming on, they lay a T. on pigs and nuts, and other articles, that there may be abundance for the feast. The T. is obviously a powerful instrument of government.

When a man has accidentally infringed the T., he may be, in some cases, freed from the state of T. by a ceremony called *moë-moë;* in other cases by a ceremony called *Fota;* in other cases by sacrificing to the offended god. A person, when he is T., must not use his hands in feeding himself or in working; were he to feed himself, it is believed that he would die; he must be fed by others until the T. is removed. In many cases, the T. can be removed only by time. Thus, a common person, who has touched a dead chief, remains tabu for ten lunar months. In several cases, breach of T. is punished with death; in many, it involves a sort of outlawry.

It is obvious that the effect of breaking a T. is to produce uncleanness: the offender has done something unholy, accursed; he must make atonement or undergo purification. The chief, recognized as a semi-divine person, descended from the gods, is the medium of purification; he has authority to loose as well as to bind. The offense is not, in general, an offense against any particular god; its punishment is looked for from the supernatural powers. T. is certainly older than most of the Polynesian gods; it must have existed for ages before the mythologies took their present shapes. It has no connection with fetichism. The Polynesians do not worship natural objects; their belief that certain plants and animals are the shrines of gods, would naturally lead to the worship of those; but in fact, they merely do not eat the plant or animal which is the shrine of their tutelary god.

The origin of T. seems a vague fear of superhuman powers; this has become associated with certain things and acts; thus practically, T. is a system of divinely appointed restraints—religion, in the primary sense of the word. This religion the chiefs and priests have for ages administered as a government, to which their avarice and ambition have given development and extension.—The underlying principle of T. is traceable in the requirements set forth by various religions in widely separated parts of the world.

TABOR, *tā'bĕr:* celebrated mountain of n. Palestine, rising solitarily 6 or 8 m. e. of Nazareth, in the n.e. part of the great plain of Esdraëlon, to about 1,000 ft., and commanding the most extensive and probably the most magnificent prospect in the Holy Land. Eastward, the eye catches a gleam of the waters of the Galilean Sea, 15 m. distant; while the whole picturesque outline of its deep-sunken basin, of the rolling trans-Jordanic plateau, and the course of the sacred river itself, is clearly traceable; westward, stretch away into the dim horizon the rich plains of Galilee, rising into the dark green ridges of Carmel, overhanging the Levant; on the n. and n. e., the snow covered heights of Hermon (see LEBANON, MOUNT) glitter pale over the intervening hills; while to the s., the view embraces the fatal heights of Gilboa and the confused landscapes of Samaria. Mt. T. is now thickly clad with forests of oak, pistacias, etc., the haunt of wolves, wild-boars, lynxes, and various kinds of reptiles. Its beauty alone would insure it

distinguished mention among the mountains of Palestine, but it owes its celebrity rather to the tradition of its having been regarded from an early period as the Mount of Transfiguration. This opinion is now almost abandoned, as there is strong evidence of its summit having been then occupied by a city. In the times of the Crusaders, T. was studded with churches and monasteries, relics of which, as well as of Roman and Saracenic structures, still remain. The modern name of T. is *Jebel-et Tŭr*.

TABOR, n., or TABOUR, n. *tā'bĕr* [OF. *tabour;* F. *tambour;* Sp. *tambor*, a drum: Ar. *tambŭr*, *tabl*, a drum: the sound of a blow is generally represented by such syllables as *tab, tap, dab, dob, top*]: small drum beaten with one stick, used as an accompaniment to a pipe or fife; it is no longer used in war, being replaced by the kettle-drum: V. to play the tabor; to strike lightly and frequently. TA'BORING, imp. TA'BORED, pp. *-bĕrd*. TA'BORER, n. *-bĕr-ĕr*, one who plays on the tabor. TABORET, n. *tăb'ō-rĕt* [F.]: a small tabor; a cushioned stool highly ornamented; an embroidery-frame. TABORINE, n. *tăb'ō-rēn*, in *OE.*, a common side-drum. TAB'RET, n. a small tabor.

TABORITES, *tā'bĕr-īts:* a sect of the Hussites in Bohemia: named from their fortress of Tabor, near the river Luschnitz, affluent of the Moldau, 49 m. s.s.e. of Prague. There is now a small town at the place (pop. 6,717).—The first leader of the T. was John Ziska (q.v.) of Trocynow. Under him was Nicolas von Hussinecz, who repelled the imperial army from Tabor 1420. The Calixtines (q.v.), desirous of the peace of the country, offered the throne of Bohemia first to King Ladislas of Poland, then to the grand duke Witold of Lithuania, afterward to his brother Coribut. Ziska refused his consent, and thus these parties became completely separated. In 1420–1, both of them set forth their creed in a number of articles. The T. absolutely rejected all ordinances of the church not expressly appointed in the Scriptures. Both parties were united by common danger in opposition to a common enemy. In 1422, Ziska defeated the imperialists at Deutschbrot, and thereafter with uninterrupted success in a number of minor conflicts; and in 1424, Prague was saved from destruction only by submitting to hard terms of peace. After Ziska's death, Procop (q.v.) the Greater, or Procop Rasa (the Shaver), and Procop the Less were their leaders. In 1427 and 31, they gained great victories at Miess and Tachau over the mercenary crusaders of the German empire, and till 1432 their incursions were the dread of the neighboring countries. The Council of Basel, finding them still unconquered 1433, proceeded to treat with them; and the Calixtines entered into an arrangement, known as the *Prague Compact*, which, however, was despised by the T. and the Orphans, as that section of the T. who considered Ziska as irreplaceable had come to be termed. The T. and Orphans were completely defeated at Böhmischbrot 1434, May 30, by the now united forces of the Rom. Catholics and the Calixtines. In the treaty of Iglau, 1436, Emperor Sigismund confirmed the compact, and promised

religious and political liberty. The civil war, however, continued till King Ladislas in the Diet at Kuttenberg 1485 established a religious peace, securing both Rom. Catholics and Calixtines in their possessions. The T. were eventually lost in the sect of Bohemian Brethren (q.v.) which arose from among them.—See HUSSITE; UTRAQUISTS.

TABRIZ, or TABREEZ, *tâ-brēz'*: great and ancient city of Persia, cap. of the province of Azerbijan, 40 m. e. of Lake Urumiah, and on the Aji, which flows s.w. into that lake. The town is surrounded by a ditch and a brick wall, pierced by 7 gates. It forms an oblong of gardens and houses, 2½ m. long; is more than 4,000 ft. above sea-level, yet appears shut in by mountains. The streets are broader and cleaner than in most eastern cities, but they are flanked as usual by the pits from which the earth required for their houses was taken; the houses are infested with noxious insects; and the bazaars are roofed with sticks, and are dark and dirty. Water is comparatively plentiful. Perhaps the principal architectural feature of the town is the fine ruin, Kabúd Masjid, or 'blue mosque,' about 300 years old, and in part covered with blue tiles beautifully arabesqued. The citadel is a spacious edifice of burned brick, whose walls have been cracked by earthquakes. Gen. Schindler (1886) stated that there were in Tabriz 318 mosques and 5 Christian (Armenian) churches; also 100 public baths.—Tabriz is the seat of a varied industry, in which leather and silk manufacturers and gold and silver smith's work are important; in recent years it has become also the emporium of an extensive trade. Smuggling is rife here, and along the whole Russo Persian frontier of Azerbijan. Chief imports are cotton fabrics, sugar, woolen cloth, and wines and spirits. Chief exports are cotton cloths, drugs and spices, dried fruits, shawls, carpets, and raw silk. The Anglo-Indian telegraph line passes through the city.

Tabriz, anc. *Tauris*, became the cap. of Tiridates III. King of Armenia, 297, and was probably at that time an old city. In 791, it was enlarged and greatly embellished by Zobaidah, wife of Harûn-al-Raschid. In 858, and again 1041, the city was devastated by an earthquake. It was taken and sacked by Timur 1392, and was soon after seized by the Turkomans, from whom it was taken by the Persians 1500. In 1721 it was again visited by a dreadful earthquake, when 80,000 persons are said to have perished. It has been several times in the hands of the Turks, but was finally taken from them by Nadir Shah 1730. Tabriz is a city of Turks, and Turkish is the language spoken. Pop. estimated about 180,000.—Eastwick's *Three Years' Residence in Persia* (Lond. 1864), and *Commercial Reports from Her Majesty's Consuls* (1878).

TABULÆ, n. plu. *tăb'ū-lē* [L. *tabŭla*, a board or

plank]: horizontal plates or floors in some corals, across the cavity of the theca. TABULAR, a. *tăb'ū-lėr*, having a flat or square surface; having the form of laminæ or plates; set down in the form of tables or synopses. TAB'ULATE, v. *-lāt*, to shape with a flat surface; to reduce to tables or synopses. TAB'ULATING, imp. TAB'ULATED, pp. TAB'ULATOR, n. *-lā-tėr*, one who tabulates. TAB'ULATION, *-lā'shŭn*, the act of throwing data into a tabular form. TABULAR SPAR, a mineral, called also *wollastonite*, occurring chiefly in broad, prismatic, or tabular masses, of a grayish-yellow or reddish-brown color, having a vitreous or pearly lustre, and consisting of silicate of lime.

TABULA RASA, phrase *tăb'ū-la rā'sa* [L. smooth waxed tablet, ready to receive any impression of the style]: in *philos.*, term used by the sensational philosophers of the 17th c. to describe the condition of the human mind before it has been the subject of experience, in opposition to the supporters of the theory of innate ideas.

TACAHOUT, *tăk'ă-hôt:* Arabic name in Algiers for the small gall formed on the Tamarisk tree, *Tamariscus Indica.* These galls have become important as a source of gallic acid for us in photography. The same gall, from India, under the name Mahee, is used for the same purpose.

TACAMAHAC, n. *tăk'ă-mă-hăk*, or TACAMAHA'CA: name applied to various resins, used chiefly as varnishes. One from Mauritius, is obtained from a tree common in India and its islands, the Poon-wood Tree, *Calophyllum inophyllum.* Another, from S. America and the W. Indies, is obtained from *Zanthoxylum* (*Fagura*) *octandra*—this is usually called Shell Tacamahac. A third, also from S. America, is yielded by a tree called *Icica tacamahaca;* it is supposed to be the Mexican Copal. A fourth is from N. America, the produce of a species of Poplar (see POPLAR.—*Balsam Poplar*).

TACCA, n. *tăk'kă* [native Malay name]: genus of tropical plants of nat. order *Taccaceæ, nearly allied to Araceæ.* They are large perennials with tuberous roots. The species are few, and are found in maritime places and wood in the South Sea Islands and warmest parts of Asia and Africa. Some (*Tacca pinnatifida*, etc.) are much cultivated for their tubers, which are used as food, though they are acrid, and require maceration in water to remove their acridity, and are eaten usually with vinegar or some acid. They contain a large quantity of starch, which is wholesome and nutritious, and is exported as substitute for W. Indian arrow-root; it is known as *Tahiti Arrow-root.* It has been said to be a cure for dysentery, which other arrow-root is not.

TACE, *tā'sē*, or TACET, *tā'sĕt* [L. *tacĕ*, be silent; *tacet*, it is silent]: in *music*, a term used to indicate when a part is to be silent during a certain time.

TACHE, n. *tăch* [see TACK]: a button; a catch; a loop.

TACHE, n. *tăsh* [F.]: in *OE.*, a stain; blemish.

TACHÉ, *tâ-shā'*, ALEXANDER ANTONINE, D.D.; Roman Catholic archbishop: 1823, July 23—1894, June 22; b. Rivière-du-Loup, Can. He made his literary studies in the College of St. Hyacinth, and studied theology in the seminary of Montreal. He then entered the order of the Oblates, and was appointed missionary to the Indians of the Northwest Territory 1846. After 5 years of exemplary devotion to his work among the scattered tribes, he was consecrated bishop 1851, and fixed his residence at Ile-à-la-Crosse. He promoted the settlement of the Red River country with French Canadians; and has been a courageous defender of their rights, as also of the rights of the Indians and half-breeds. Taché became archbishop of St. Boniface 1871. He was author of *Vingt années de missions dans le nord-ouest de l'Amérique.*

TACHE, SIR ETIENNE PASCHAL: Canadian politician: b. Saint Thomas, Quebec, 1795, Sep. 5; d. 1865, July 29. He practiced medicine until 1841, when he became a member of Parliament; from 1848-9 was commissioner of public works; and from 1856-7 was speaker of the legislative council. He published *Du developpement de la force physique chez l'homme* (1829); *Reflexions sur l'organisations des Volontaires* (1863).

TACHEOMETRY, *tăk-e-ŏm'ĕ-trĭ*: a term applied in surveying to method which does away with the practice of measuring distances by the chain or tape-line, and ascertaining difference of level by a separate instrument, the relative position, both horizontal and vertical, of points on the earth's surface being determined by one observation. A theodolite, or a specially constructed tacheometer, of which a telescope is an important part, is employed, and along with it a staff similar to a leveling-staff, 12 ft. or so in length, and suitably marked or graduated.

TACHI'NA-FLIES: flies of the family *Tachinidæ*, a large and important group resembling house-flies and noted for their parasitic habits. They are usually of medium or rather large size and gray, more or less striped; the wings clear, the bodies bristly; and have a disposition to fly in the sunshine with a buzzing noise. All are parasitic, and are especially fond of laying their eggs upon the backs of caterpillars.

TACHOMETER, n. *tă-kŏm'ĕ-tĕr* [Gr. *tachos*, speed; *metron*, a measure]: contrivance for indicating small variations in the velocity of machines, also for measuring velocity of running water.

TACHY-, prefix *tăk-ĭ-* [Gr. *tachus*, swift]: attended with swiftness; endowed with speed.

TACHYDROMIAN, n. *tăk'ĭ-drō'mĭ-ăn* [Gr. *tachus*,

swift; *dromos*, a course, a running]: one of a family of wading birds; one of a family of saurian reptiles, also of dipterous insects.

TACHYGRAPHER, n. *ta-kĭg'ra-fėr* [Eng. *tachygraphy*]: one who writes in shorthand; a stenographer. TACHYGRAPHIC, a. *tăk-ĭ-graf'ĭk*, TACHYGRAPHICAL, *-al*, of or pertaining to tachygraphy; written in shorthand. TACHYGRAPHY, n. *ta-kĭg'ra-fĭ* [Gr. *tachus*, swift; *graphō*, I write]: act or art of rapid writing; shorthand; stenography.

TACHYLITE, n. *tăk'ĭ-līt* [Gr. *tachus*, quick; *lithos*, a stone]: a lack vitreous mineral of the hornblende family, so called from its being easily fused under the blowpipe.

TACIT, a. *tăs'ĭt* [F. *tacite*—from L. *tacĭtus*, silent; *tacērĕ*, to be silent: It. *tacito*]: implied but not expressed in words; silent, as a *tacit* agreement. TAC'ITLY, ad. *-lĭ* silently; without giving expression to in words.

TACITURN, a. *tăs'ĭ-tėrn* [L. *tacĭturnus*, of few words —from *tacĭtus*, silent; *tacērĕ*, to be silent]: close or reserved in speech; habitually silent. TAC'ITURN'ITY, n. *-ĭ-tĭ*, habitual silence or reserve: in *Scotch* law, mode of extinguishing an obligation by the mere silence of the creditor through a sufficiently long time. TAC'ITURNLY, ad. *-lĭ*.

TACITUS, *tăs'ĭ-tŭs*, MARCUS CLAUDIUS: Roman emperor: b. 200 A.D.; d. Tyana, Cappadocia, 276, April. He was descended from Tacitus, the historian, whose works he deposited in all the public libraries and caused them to be transcribed 10 times a year at the public charge. On the death of Aurelian he was called to be emperor by the senate, although against his will (275). At the age of 75 he undertook a campaign against the Alani, in the course of which he was assassinated by his own unbridled soldiery.

TACITUS, *tăs'ĭ-tŭs*, CAIUS (or PUBLIUS) CORNELIUS: famous Roman historian and 'the last classic of Roman literature:' about 55-120. Concerning his parentage, date and place of birth and death, and even his first name, we have little more than conjecture and inference. From the emperors Vespasian, Titus, and Domitian, he received promotion and other marks of favor; and in 78 he married the daughter of Caius Julius Agricola. In 88, when Domitian was emperor, and Tacitus prætor, he assisted as one of the quindecemviri at the celebration of the *Ludi sæculares*. Agricola died in Rome 93, while Tacitus and his wife were absent; and nothing further is known of the historian till 97, when, in the region of Nerva, he was appointed consul suffectus, succeeding Tacitus Virginius Rufus, whose funeral oration he delivered. Tacitus had already attained distinction as an orator when the younger Pliny was entering public life; and both of them were appointed, in Nerva's reign, in 99, to conduct the prosecution of Marius, then proconsul of

Africa. Tacitus became one of the most intimate friends of Pliny, of whose letters 11 are addressed to him. His extant works, arranged chronologically, are: (1) *Dialogus de Oratoribus*, the earliest, but undoubtedly a genuine work of Tacitus. (2) *Vita Agricolæ*, written in 97 or 98 after the death of Domitian, universally admired as a masterpiece of noble sentiment and pregnant epigram. (3) *Germania.* This ethnographic treatise is trustworthy only as regards those Germans best known to the Romans from their proximity to the Rhine; for the provinces beyond that river, its statements are based on hearsay and its geography is weak. (4) *Historiæ*, written after Nerva's death, 98, and completed about the end of Trajan's reign, 117, and embracing the period from the second consulship of Galba, 68, to the death of Domitian, 96. Only the first four books have reached us in a perfect state, but there must have been many more. (5) *Annales*, from the death of Augustus, 14, to the death of Nero, 68; these also have reached us in an imperfect state. Tacitus is one of the greatest of historians. In love of truth and integrity of purpose, he is equalled by few; in conciseness of phrase and power of saying much and implying more in one or two strokes of expression, he is scarcely rivalled; in occasional obscurity and rhetorical affectation as well as in positive genius, he has been compared to Carlyle. The best complete editions are those of Orelli (1859), Nipperdev (1874), and Halm (1889-91). The following special editions may be noticed: Gudeman's *Dialogus* (1898), *Agricola* and *Germania* (1900); Furneaux' *Agricola* (1898), *Annals* (1884); Allen's *Annals* (1890), and Godley's *Histories* (1896). The translations by Church and Brodribb (1877, etc.) are especially good.

TACK, n. *tăk* [Ir. *taca*, a peg, nail, fastening: Gael. *tacaid*, a tack, peg: Bret. *tach*, a small nail: Ger. *zacke*, a jag, a prong: Low Ger. *takk*, a point, a tooth]: very small nail with flat head: a slight fastening: in *nav.*, the course of a ship with reference to the position of the sails; the rope which fastens the foremost corner of the sail to the windward side of a ship, which is said to *tack*, in going against a wind when the *tack* is changed from one side to the other (see below): addition or supplement, as to a bill passing through parliament; in *Scots law*, a lease of land: V. to attach or fasten slightly; to stitch together; to unite; to join; to change the course of a ship by shifting the tacks and position of the sails; in *parliament*, to add a supplement to a bill in its progress through the houses. TACK'ING, imp.: N. act of changing a ship's course (see below): very long stitches in needle-work to keep two pieces of material together, till they can be stitched closely. TACKED, pp. *tăkt.* TACK'ER, n. *-ĕr*, one who makes an addition or supplement. TACKET, n. *tăk'ĕt*, in *Scot.*, a small short nail which has a thick head. TACKS'MAN, n. in *Scot.*, one who holds a lease of

land, etc., from another; a lessee. TACKING OF MORTGAGES in *Eng. law*, act of a third mortgagee, who became so without notice of a second incumbrance, and who afterward purchasing the first mortgage also, of right tacks one to the other, and so obtains priority for the third mortgage over the second. ON THE STARBOARD TACK, having the wind on the right side, said of a vessel in sailing (see LARBOARD). TO BEAR TACK OR HOLD TACK, in *OE.*, to hold out; to last.

TACKET, n. *tăk'ĕt:* see under TACK.

TACKLE, n. *tăk'kl* [Dan. *takkel;* Sw. *tackel;* Dut. *takel*, tackle, fittings of a ship: W. *tacl*, a tool, tackle]: among *seamen*, a pulley of two or more blocks, with suitable ropes, for raising and lowering heavy weights; the ropes, rigging, etc., of a ship; harness; gear; apparatus; in *OE.*, weapons; instruments of action: V. to supply with tackle; *familiarly*, to attack vigorously, as any labor. TAC'KLING, imp. *-klĭng:* N. furniture of the masts; instruments or apparatus. TACKLED, pp. *tăk'kld;* ADJ. made of ropes tacked together. GROUND-TACKLE, anchors, cables, and the like. FISHING-TACKLE, the apparatus used for fishing. GUN-TACKLE, the apparatus for the management of guns on board ship.

TACK—TAC'KING: terms much used in navigation. The *tack of a sail* is the lower windward corner. The *tack* is the rope employed in hauling down that corner to its proper position. The *tack* of a fore-and-aft sail is its lower forward clue or corner; also, the rope for hauling down that corner. A ship is said to be on the *starboard tack* when she is close-hauled with the wind on the starboard side; and on the *port tack* similarly with the wind on the port side.

Tacking is beating up against an adverse wind by a zigzag course. If a vessel at A require to sail due n. to B, and if the wind be either n. or from any point n. of the line CAD, it is obvious that the wind will not carry her directly to her destination. As an extreme case, let the wind be n., or dead against her. By setting her sails obliquely, as at A, it will be possible to beat up in the direction AE. If the master consider that at E he has passed sufficiently from his straight course to B, he will then put his helm a-lee, which brings the ship's head straight to the wind, the tacks of the sails being at the same time set free. The after-sails are then smartly braced over to the opposite side, and the ship's head falls off from the wind in an opposite direction to that previously held, until the course is EF. This process is repeated on each

side of the line AB, until at length the ship makes her port, B. The length of each tack, as EF, is called a *board.* When the wind is straight ahead, as in the above example, the several boards should obviously be equally on each side of the line AB. If, however, the wind were not so direct, it would be necessary that the boards in one direction should be shorter than those in the other. Sometimes, from the nature of the channel, it is necessary to take a long tack one way, say to starboard, and a very short one to port. This is known as 'sailing with a long and a short leg.'

TACKY, a. *tăk'ĭ* [*tack,* to fasten, etc.]: sticky; tenacious.

TACNA, *tâk'nâ:* former province of the s. dept. (Moquegua) of Peru. In the treaty of peace (1883, Oct. 20) following the war with Chili, Peru ceded the provinces of T. and Arica to Chili for 10 years, agreeing that the provinces should then decide by popular vote whether they would return to the jurisdiction of Peru or remain with Chili. Pop. (1896) 50,449. The cap. has pop. 11,000.

TACOMA, *tâ-kō'mâ:* city, cap. of Pierce co., Wash.; on Commencement Bay, at head of navigation on Puget Sound; w. terminus of the N. Pacific railroad. It has one of the best harbors in the world, with steamship communication with all ports on the Pacific coast and with the Orient, and nearly 4 m. of improved wharves; and has railroad shops and car-works for more than 1,000 m. of road. In 1889 the N. Pacific railroad company voted $6,000,000 to be expended in T., within three years, in terminal improvements. City had (1902) costly water gas and elec. light works; excellent sewerage; 20 hotels; 20 public-school buildings (7,479 enrolled pupils); Annie Wright Seminary; Washington College; Methodist Univ. for the Pacific Northwest; 70 churches; 2 parks, one of 662 acres; 4 hospitals; chamber of com. bldg.; gen. offices of the railroad co. (bldg. cost $150,000); 80 m. of city and suburban st. railroad completed and under construction; 4 pub. halls; theatre; 3 nat. banks (cap. $500,000); 1 savings bank, 3 state banks; 3 trust companies (capital $375,000), 1 branch of an English bank (home cap. $5,450,000); and 1 investment company; and 2 daily, 8 weekly, 7 monthly, and 1 quarterly periodicals. There are 12 saw-mills—one the largest in the n.w., with capacity of 400,000 ft. per day—output of all mills about 1,000,000 ft. per day; 11 iron-foundries, besides those connected with the railroad shops; several shingle-mills; tile and terra-cotta works; iron and stove works; furniture, soap, broom, cracker, oatmeal, box, and cement factories; several breweries; ice and refrigerating works; 5 large flour-mills; several grain warehouses and grain elevators; and 3 shipyards. The exports for 11 months in 1901 were valued at $20,000,000; imports at $10,350,000. The foreign shipments of wheat (1901) were 10,000,000 bushels, flour 850,000 barrels, lumber shipments by water (1900) 81,238,111 feet;

shipments of coal (1901) 850,000 tons; tea imports 9,360,-219 pounds; vessels cleared 699; outward registered tonnage 934,676. There were 381 manuf. estab. which emp. 4,347 hands, paid $2,356,028 wages, and received $12,029,497 for products. The assessed value of city prop. was (1906) $25,261,215; bonded debt $3,550,000. T. is the only point on Puget Sound at which cargoes of tea and oriental goods for transhipment e. have been received. Within 30 m., in the foot-hills of the Cascade Mountains, are immense beds of bituminous coking coal, now being systematically worked; and near are large deposits of iron ore. Between T. and the mountains, and between the Puyallup and Nesqually rivers, are large tracts of rich farming-land, notably adapted to fruit, hay, hops, and vegetables; and the White River and Puyallup valleys produce the finest hops in the country. Pop. (1880) 1,098; (1890) 36,006; (1900) 37,714; (1910) 83,743.

TACONIC MOUNTAINS, *tâ-kŏn'ĭk*, or TAGHKANIC, *tŏk'-hŏn-ĭk:* name applied e. of Hudson river, and in Conn. and Mass., to a subordinate range of the Appalachian system. It is a continuation of the Highlands, which cross the Hudson below Newburgh, and it curves through the s.e. part of Dutchess co., thence n. coincident with the w. line of Conn. and Mass., and through central Vt., in which last state, however, it is known as the Green Mts., as are also the mts. in Mass. between the more easterly Hoosac ridges and the Connecticut river. Its acclivities are not usually abrupt, but suited to forest and to upland cultivation. It is characterized by scenery pleasingly diversified. Its rocks are mostly slate and limestone, affording marble, as at Stockbridge, Mass., and valuable iron ores in N. Y. and Conn.; also manganese. The dip of the rocks is in general 30°—50° east. Their age was a subject of great controversy for many years: see TACONIC SYSTEM. The highest peaks are Mt. Washington, in the s.w. corner of Mass., 2,624 ft., and Greylock, in the n.w. corner, 3,600 ft., otherwise known as Saddle Mt. or Saddle-back.

TACON'IC SYSTEM: term applied to rocks of the Taconic Mountains, and now significant only of a long and famous controversy as to their stratigraphical relations and age. The controversy illustrates the fact that the 'conflict of science' is sometimes quite as much with itself as with outside bigotry. It began with Prof. Ebenezer Emmons's N. Y. geol. report 1842, in which he claimed that the rocks are older than Potsdam sandstone, and form a new system. They and their fossils were so imperfectly known, and the strata are so tilted, folded, and faulted, that his sweeping conclusion was not strange. He met with much and even scornful opposition; it is said that he was treated personally with indignity by reigning geologists, and that his last years (d. 1863) were much afflicted by it. He did good pioneer work, however; and his conclusions have been proved true in respect to a part of the series of rocks as antedating Potsdam sandstone, and now referred to lower Cambrian. There are in general three associated Taconic formations: quartzite, limestone, and the slates and schists. Prof. Emmons's system, afterward modified not very essentially by himself, was as follows (the oldest here placed at bottom, as should be the rule always in such tables), compared with the age as determined more recently—there being still some doubt as to how far the slates belong to the Hudson group or the Cambrian:

Prof. Emmons.	Recent Geologists.
Taconic slate.	Hudson and Cambrian.
Sparry limestone.	Lower Silurian.
Magnesian slate of Taconic Ms	Hudson slate.
Limestone.	Lower Silurian.
Granular quartz.	Cambrian.
Magnesian slate of Greylock.	Hudson slate.
Stockbridge limestone.	Lower Silurian.

He was right also as to the age of the 'black slate of Bald Mt.,' which, as well as his 'granular quartz' (quartzite), is found to have *Olenellus* and other fossils of the lower Primordial.

TACT, n. *tăkt* [F. *tact*, feeling, touch—from L. *tactus*, pp. of *tangĕrĕ*, to touch]: peculiar skill or faculty; skill in adapting words or actions to circumstances; delicate handling; nice discernment. TACT'LESS, a. *-lĕs*, without tact.

TACTICS, n. plu. *tăk'tĭks* [Gr. *taktika*, military tactics, *taktikos*, fit for arranging—from *tassō*, I array: F. *tactique*] evolutions and maneuvers in the position and arrangement of troops or of ships of war in the presence of an enemy; science and art of disposing military and naval forces for attack or defense (see TACTICS, MILITARY: TACTICS, NAVAL): way or method of proceeding or acting. TAC'TIC, a. *-tĭk*, or TAC'TICAL, a. *-tĭ-kăl*, of or relating to tactics. TAC'TICALLY, ad. *-lĭ*. TACTICIAN, n. *tăk-tĭsh'ăn*, one skilled in naval or military tactics; an adroit manager or contriver.

TACTICS, MILITARY: department of milit. science or art which concerns the evolutions of a force in the presence of the enemy: distinguished from Strategy (q v.), which is the art of maneuvering armies with reference to the objects of the whole campaign—the securing of communications, the cutting off an enemy from his base, throwing him into a position where he must fight at a disadvantage, or surrender, etc. It is the strategy of the immediate battle-field; the science of maneuvering and combining those military units which drill, discipline, and the regimental system have brought to the precision of machines. It was described by Napoleon as *the art of being the stronger*—that is, of bringing an overwhelming force to bear on any given point, whatever may be the relative strength of the entire armies opposed.

The earliest records of battles are those of mere single combats, in which the chiefs, fighting either on foot or in chariots, performed great deeds; and the commonalty, who apparently were without discipline, counted for little. With the growth of democracy arose the organization of the Phalanx (q.v.), whose advance was irresistible; and its firmness equally so if charged in front; but which changed front with great difficulty; was much deranged by broken ground; and failed entirely in a pursuit, or if attacked in flank. Far lighter, and more mobile, was the Roman Legion (q.v.). Among Roman tactics was also the admirable intrenchment, which they scarcely ever omitted as an additional source of strength for their position.

'Events reproduce themselves in cycles;' and with the decay of Roman civilization came again the mail-clad heroes and cavaliers—mounted this time on horses—who monopolized the honors of battle, while the undisciplined footmen had an undue share of the dangers. Later in the feudal period, this disparity between knight and footmen was diminished by the employment of bodies of archers, whose shafts carried distant death. The adoption of gunpowder for small-arms altogether neutralized the superiority of the armored knight, brought infantry into the front place in battle, and threw cavalry into the status of an auxiliary. The French revolutionary wars tended much to the development of artillery as a field-weapon, and Napoleon employed this terrible engine to its fullest extent, a practice followed by the best modern generals, who never risk a man where a cannon-ball can do the work. Frederick the Great was considered an innovator, for fighting with infantry four deep. During the French war, the formation of three deep became general, and still obtains in several European armies. Before the battle of Waterloo, the British leaders had acquired sufficient confidence in their troops to marshal them in a double line. It is in question whether the advance in arms of precision may not necessitate the formation in a single line, or even in a single line in open order.

The following indicate a few of the most important principles in this intricate science:

First, as to the art of being the stronger—undoubtedly

the highest recommendation in a general—we may cite the battle of Rivoli. In 1796 Napoleon was besieging Mantua with a small force, while a very much smaller army operated as an army of observation. The Austrian commander had collected at Trent a force powerful enough to crush completely the French army, and was marching south. Parallel with his course lay the lake of Garda, and to prevent Napoleon escaping up one side, as he marched down the other, the Austrian leader divided his army into two powerful corps, and marched one down each side of the lake. The instant the young French general knew of this division, he abandoned the seige of Mantua, collected every available man, and marched against one body of the enemy. Though far inferior on the whole, he was thus superior at the point of attack, and the victory of Rivoli decided virtually the whole campaign. This corresponded in principle with Napoleon's general tactics in battle. He formed his attack into column, tried to break through the centre of the enemy's line; and if he succeeded, then doubled back to one side, so as to concentrate the whole of his own force against one-half of the enemy's, which was usually routed before the other half of the line could come up to the rescue.

Taken collectively, the tactics of the three military arms may be thus summarized: The infantry form the line of battle, and probably decide the day by a general advance over the enemy's ground. The calvary seek to break the opposing infantry by frequent charges in front, or on any flank left exposed: if a part of the line wavers, a charge of horse should complete the disarray: when the rout begins, the cavalry should turn it by furious onslaught into utter discomfiture. The province of the artillery is to cannonade any portion of the line where men are massed, or where a charge is about to be made; to demoralize cavalry, and generally to carry destruction wherever it can best disconcert the enemy.

We advert to the tactics of the several arms individually.

Infantry.—This force has four formations—skirmishers, line, column, and square. The skirmishers precede and flank an advancing line or column, picking off the enemy, whose masses offer good mark, while their own extended order gives them comparative impunity. If resistance be encountered in force, the skirmishers retreat behind their massed supports. The line is a double or treble line of men, firing or charging. For musketry purposes, it is the most formidable formation, and is a favorite tactic where the officers can depend on the steadiness of their men. For bursting through a line, the deep column is the most effective. It was the favorite French formation during the revolutionary and Napoleonic wars, which only the British and the Russians succeeded in resisting. At Vimiera, the 50th Brit. regt., 700 strong, stood in line: it was attacked by a column of 2,000 French. The English col. threw back his left (the end attacked), and advancing his right, delivered a volley at point-blank range, charged the column in flank, and utterly routed it before the French

could deploy into line to resist the onslaught. The column is the best formation on a march; the line, in actual collision with the enemy. The formation in Echelon (q.v.) to a great extent combines these advantages. See SQUARE.

Cavalry.—The function of heavy cavalry is limited to the charge in line. The light cavalry form in small sections, to scour the country, collect supplies, and cut off stragglers.

Artillery.—No distinct tactics exist for this arm beyond the fact that a concentrated fire is vastly the most effective; and that the artillery should always have a support of infantry at hand, to protect it from a sudden incursion of hostile cavalry.

Tactics of position depend on the moral energy of the commander-in-chief. Few would dare, as Cæsar did, an invasion in which there was no retreat, if defeated. It is a military maxim not to fight with the rear on a river, unless many bridges be provided for retreat, in case of disaster. A convex front is better than a concave front, because internal communication is more easy. The flank should be protected by cavalry, or preferably by natural obstacles. In battle, a long march from one position to another, if the march exposes the flank to the enemy, is a fatal error: thus the French won Austerlitz, and lost Talavera. In a pursuit, a parallel line is better than the immediate route that the retreating enemy has taken, as supplies will be more readily procured, and he may by celerity be attacked in flank: this was strikingly exemplified in the Russian pursuit of Napoleon's army retreating from Moscow.

In the United States a new system of *Drill Regulations*, compiled by a special tactical board of army officers, superseded the *Tactics* of Casey and Upton 1892, Jan. 1, and made radical changes in the methods of handling troops.

TAC'TICS, NAVAL: science or art of the evolutions of war-ships in presence of an enemy. With the advent of steam, armored ships, and powerful rams, the tactics under which Rodney and Nelson conquered have passed away, while the principles of the new warfare have scarcely been sufficiently established for reduction to theory.

In ancient naval engagements, where the vessels fought on the comparatively smooth waters of the Mediterranean, and where the use of oars rendered the commanders nearly independent of the wind, the attack consisted of a charge with the beaked prows, followed, if that failed, by the use of balistæ and a hand-to-hand struggle: see NAVIES, ANCIENT. The introduction of gunpowder, with broadside ordnance, necessitated a change, and the great desideratum of each admiral was to present as long a line of broadsides as possible to the enemy, to take care that none of his ships was masked by intervention of another between it and the foe, and to endeavor in each ship to oppose its broadside to the bow or stern of a hostile ship, so as to obtain the preponderance of force, and to rake his decks. The ships of two or more decks formed the line of battle, while frigates and smaller vessels served as look-outs and skirmishers. A fleet in one line would, however, have been of inconven-

ient length for sailing; and it was usual to sail in three, six, or nine parallel lines while traversing the ocean, the ships of the rear lines tacking into their places in the line of battle on the signal to form for action. The great principle of maneuvering was to get the weather-gage, i. e., to be to windward of the enemy, both for facility of navigation and because the smoke would inconvenience him most. The standing attempt during the French war was to double the enemy's line (see CLERK, JOHN, of Eldin) by piercing it, or passing it at the van or rear, and then, by tacking in its rear, to place his ships between two fires: this was practiced first in Lord Rodney's action 1782, and was successfully repeated by Nelson at the battle of the Nile. Under steam, and with ships carrying colossal ordnance, naval tactics have entirely changed. It was formerly the object to avoid being raked; it is now to avoid being hit at all, since the projectiles used are so tremendous that a few hits involve destruction. Ships are consequently constructed to offer the least mark to ordnance: and with the same view, they are kept constantly in rapid motion. Actions are fought, not, as in old time, within pistol-shot, but at a mile or two miles' distance. The loss of life is less; for the battle is no longer decided hand to hand by the cutlass and the boarding-pike, following a furious cannonade; but after a few long shots with ponderous missiles, one or other vessel becomes disabled, and being helpless, yields the victory to her foe. The ships are steamed end on when they act as rams, also thus to offer less mark to shot.—See *Examples and Maxims of Modern Naval Tactics*, by Commander W. Bainbridge-Hoff, U.S.N. (Portsmouth, 1885).

TACTILE, a. *tăk'tĭl* [F. *tactile*—from L. *tactĭlis*, that may be touched—from *tango*, I touch]: that may be touched or felt; tangible. TAC'TILELY, ad. *-lĭ*. TACTILITY, n. *tăk-tĭl'ĭ-tĭ*, the state of being tangible; tangibleness. TACTION, n. *tăk'shŭn*, the act of touching; touch. TAC'TUAL, a. *-tū-ăl*, pertaining to touch; derived from touch. TAC'TUALLY, ad. *-lĭ*.

TACUBAYA, *tâ-kô-bâ'yâ*, MEXICO: a city in the federal district, situated 3 m. s.w. of Mexico City. It is the principal pleasure resort of the valley of Mexico, and has many fine buildings and gardens. The national observatory is situated here, as well as the castle of Chapultepec. Pop. 15,259.

TADEMA, LAURENCE ALMA: See ALMA-TADEMA, LAURENCE.

TADOUSAC, *tä-doo-zäk'*, Canada: a town in Chicoutimi and Saguenay co., Quebec, situated at the confluence of the Saguenay river with the Saint Lawrence. It is a summer resort, and noted as being the oldest settlement in Canada. It was one of the early centres of the fur trade, and the home for a time of Father Marquette. Remains are still visible of one of the early Jesuit establishments. Pop. (1901) 511.

TAD'MOR. See PALMYRA.

TADPOLE, n. *tăd'pōl* [compounded of *toad,* and *poll,* the head, which see]: a frog in its first state from the spawn (see FROG). TADPOLE-FISH, a teleostean fish resembling the animal from which it takes its name.

TA'EL, *tāl:* a money of account in China, the value of which varies considerably according to locality and the rate of exchange. The tael is a definite weight of silver, equal to 1.23 ounces troy, and accordingly varies in value as silver varies. The sterling value of the Haikwan or customs tael is now about 75 cents.

TA'EN, v. *tān:* a poetical contraction for *taken.*

TÆNIA, n. *tē'nĭ-ă* [L. *tænĭa;* Gr. *tainĭa,* a ribbon]: intestinal worm, usually called the *Tapeworm* (q.v.): in *arch.,* the fillet or band above the architrave of the Doric order. TÆ'NIOID, a. *-oyd* [Gr. *eidos,* resemblance]: shaped like a ribbon, as the Tapeworm (q.v.). TÆNICIDE, *tē'nĭ-sīd* [L. *cædere,* to kill]: drug designed to kill tapeworms.

TAE-PINGS, or TAI-PINGS, *tī-pĭngz':* Chinese rebels who began a warfare 1850 which desolated some of the best cultivated provinces. (For the strange fanaticism which characterized this rebellion, see CHINESE EMPIRE —*History.*) After the war of 1860, it became the interest of the English, French, and American governments to re-establish order in China. The repulse of the rebels at Shanghai 1860, Aug., had been followed by several engagements between them and the imperialists, in which the Tae-pings were defeated, mainly in consequence of the reorganization of the imperial army by Frederick T. Ward (q.v.), an American. In the beginning of 1862, the Tae-pings again advanced on Shanghai, and were twice defeated. In that year Ward was killed; and 'Ward's force,' transferred to an English officer, Charles G. Gordon (q.v.), took the name Gordon's brigade, and rendered essential service to the imperial government. The rebels were defeated in more than 16 engagements; and in 1864 almost every important city was taken from them. The conduct of the imperial authorities at Suchow, in permitting a horrible massacre, led to withdrawal of the English military force; but the rebellion had been effectually checked. The Tae-pings were finally dispersed, 1865, April, when they were routed by the imperial army at Kia-ying-chou in Kwan-tung. In the same year, the Nienfei, or marauders of the north, began to be troublesome. This was a marauding expedition, without political significance, organized by restless spirits among farmers who had been ruined by the overflowing of the Yellow river, the repair of whose embankments had been neglected on account of the confusion and expense of the Tae-ping rebellion. The last show of active warfare made by a body of Nienfei was in the beginning of 1866, when, joined by some imperialist regiments whose pay was in arrears, they threatened Hankow; and would have attacked the European Settlement but for

the arrival of English gun-boats. The malcontent imperialists were brought back to allegiance.

The Mohammedans of n.w. China have often given trouble, and are apt to be confounded with the Taepings. See PANTHAYS.

TAFFEREL, n. *tăf'fĕr-ĕl,* or TAFFRAIL, n. *tăf'rāl* [Dut. *tafereel,* a panel—from *tafel,* a table—from L. *tabŭla,* a table]: in a *ship,* the uppermost part of the stern (usually as *Taffrail*): the rail over the heads of the stern-timbers, extending across the stern from one quarter-stanchion to another.

TAFFETA, n. *tăf'fĕ-tă,* or TAF'FETY, n. *-tĭ* [F. *taffetas;* It. *taffetta,* taffeta—from Pers. *taftah*—from *taftan,* to twist, to spin: thin, glossy, silken fabric, having a wavy lustre, much used for curtains and hangings: in *med.,* a plaster spread on thin silk. The term taffeta has had a very various application at different periods; and has now become a sort of generic term for *Plain Silk,* Gros de Naples, Gros de Indes, Shot or Chameleon Silk, Glacé, and many others; and even for some combinations of silk, wool, and other materials. TAFFETA PHRASES, smooth, sleek, honeyed phrases; euphemisms.

TAFILET, *tâ-fē-lĕt',* or TAFILELT, Morocco: a southern oasis, 200 m. s. by e. of Fez. It covers about 530 sq.m., and has a belligerent population of about 100,000 distributed among about 150 villages, of which Abuam is the most important. The date-palm is cultivated and silks, carpets, and other articles are made to some extent. Consult Harris, *Tafilet* (1895).

TAFFRAIL. See TAFFEREL.

TAFFY, n. *tăf'fĭ:* meaning 'David,' the familiar name for a Welshman.

TAFFY: candy made of molasses or sugar, boiled down, and cooled in shallow pans; in *slang,* flattery. In England the candy is called *Toffy.*

TAFT, ALPHONSO, LL.D.: 1810, Nov. 5—1891, May 21; b. Townsend, Vt.: jurist. He graduated at Yale College 1833, was tutor there 1835-37, was admitted to the bar 1838, and settled in Cincinnati to practice 1840. In 1856 he was defeated as republican candidate for congress; 1866-72 was judge of the supreme court of Ohio; 1876, Mar. 8—May 22, secretary of war; 1876-8 U. S. attorney-general; 1882-84 U. S. minister to Austria; and 1884-5 U. S. minister to Russia. He received his degree from Yale 1867, was a member of its corporation 1872-82, and was for many years a trustee of the University of Cincinnati.

TAFT, LORADO: American sculptor: b. Elmwood, Ill., 1860, Apr. 29. He was graduated at the University of Illinois; studied at the Ecole des Beaux Arts (1880-3), where he received prix d'atelier. He has been instructor in the Chicago Art Institute since 1886; lecturer on art in the University of Chicago (1892-1902). He was com-

missioned to decorate the horticultural buildings of the World's Columbian Exposition, and gained the designer's medal for the work. His statue group *Solitude of the Soul* was awarded a silver medal at the Pan-American Exposition. He has published *History of American Sculpture* (1903).

TAFT, WILLIAM HOWARD, B.A., LL.B., LL.D.: twenty-seventh President of the United States: b. Cincinnati, Ohio, 1857, Sep. 15. The son of Alphonso Taft, he was graduated at Yale in 1878, and after a course at the Law School of Cincinnati College in 1880 began to practice in that city. In 1881-2 he was assistant prosecuting attorney for Hamilton co., and in the latter year was made collector of internal revenue. In 1887-90 he was a judge of the superior court of Cincinnati, in 1890-2 solicitor-general of the United States, and from 1892 to 1900 a judge of the United States circuit court. In 1898 he became professor and dean of the law department of the University of Cincinnati. In 1900 President McKinley appointed him chairman of the commission to organize civil government in the Philippines, and in June, 1901, he became the first civil governor of the islands. He established civil government in all the provinces; a public school system with 1,000 American and 2,500 Filipino teachers, and schools in 600 of the 900 towns; a judiciary system with a supreme court and 15 judicial district courts; a health department, coöperating with local health officers in all parts of the islands, and dealing effectively with the native pests, cholera, bubonic plague, and rinderpest; postal and civil-service systems with stringent regulations; and he satisfactorily settled the questions concerning the friars and their lands. Besides proving himself an efficient administrator, Gov. Taft achieved results of vast importance in the work of conciliation. On Dec. 29, 1903, he was recalled to succeed Elihu Root as secretary of war in President Roosevelt's cabinet, and entered upon his duties Feb. 1, 1904. Nov.-Dec. 1904, Secretary Taft visited Panama to confer with the authorities there, by direction of the President, upon questions arising in regard to the government of the canal zone. In 1906 he was sent to Cuba by President Roosevelt to adjust the troubles arising from an insurrection and for a time acted as provincial governor of the island. Later he visited Panama, Cuba and Porto Rico, to familiarize himself with conditions in these countries. Again visited the Philippines, and Japan, returning by way of Russia. He was nominated for the presidency by the Republican party, and at the November election of 1908, received a plurality of 1,045,715 votes. In the early part of 1909, he visited Panama to make a personal inspection of the canal works, and on Mar. 4 of same year was inaugurated as president, the 27th person to fill that office.

TAG, n. *tăg* [Sw. *tagg;* Low Ger. *takk;* Ger. *zacke,* a point, a thorn (see also TACK)]: a metallic point at the

end of a string or lace; the end or extremity: anything paltry and mean; a sheep of the first year: V. to fit with a point, as a lace; to fit one thing to another, with *on*. TAG'GING, imp.: N. materials for tags. TAGGED, pp. *tăgd*. TAGSORE, a disease in sheep. TAG-TAIL, a worm having its tail different in color from the body. TAG'RAG, n. *-răg*, the rabble. TAG, RAG, AND BOBTAIL, the rabble; the dregs of the people.

TAGABALOYES, *tâ-gâ-bâ-lō'yās:* the name given by Spanish explorers to the people living in Mindanao, Philippines, w. of Caraga and Bislig, also mentioned by English authors. Their region has been well explored, but only Manobos and Mandayas have been found there.

TAGABAWAS, *tâ-gâ-bâ'vâs:* a Philippine people living on both sides of Dávao Bay, Mindanao, a mixture of several Malay tribes.

TAGACAOLOS, *tâ-gâ-kâ'ō-lōs:* a Philippine tribe, whose settlements are scattered among other tribes along Dávao Bay, Mindanao.

TAGALS, *tâ-gâls'*, TAG'ALOGS, or TAGALOS: a Philippine people of Malay origin, inhabiting chiefly Manila, the provinces of Cavite, Bataán, Bulacán, Batangas, Infanta, Laguna, and Mindoro, and scattered among other tribes in several other provinces. They are Christians, and one of the leading people of the archipelago, both in numbers and in culture; they possessed an alphabet and considerable civilization before the arrival of the Spaniards. They were the leading element in the last insurrection against Spain, and proved troublesome after American occupation. They are, however, intelligent, shrewd, and generally industrious; and when once comprehending American ideals prove trustworthy.

TAGANROG, *tâ-gân-rŏg'*, Russia: a town in the government of Ekaterinoslav, on a lofty promontory, on the Sea of Azov, opposite the mouth of the Don, 28 m. w.n.w. of Azov. There is a monument to Alexander I., who died here; also churches, exchange, gymnasia, etc. It has manufactures of candles, leather, tobacco, macaroni, etc. The harbor, though the deepest in the Sea of Azov, is shallow, not admitting vessels which draw more than 10 ft.; but its situation secures to it a considerable trade. The principal exports are wheat, rye, barley, oats, linseed, rapeseed, wool, oil-cake, caviar, and butter; the imports include fruit, oil, machinery, hides, mineral oil, dry goods, wine, etc. Pop. 51,748.

TAGBANUAS, *tâg-bâ'nô-âs:* a Philippine people living in the island of Palawan, and in the Calamianes. They are Malays with a mixture of Negrito blood, and are heathens with the exception of the Calamianos. They once had an alphabet of their own, and appear to have attained a higher grade of culture than they now possess.

TAGBILARAN, *tâg-bē-lâ'rân*, Philippines: pueblo,

capital of the province of Bohol; on the s.w. coast. Opposite the town is the important dependent island of Panglao, separated from the mainland by a strait 1 m. in width. The chief industries are agriculture and turtle fishing. Pop. 8,640.

TAGES: in early Italian mythology, son of a minor local deity, or genius, and grandson of Jupiter. He taught the Etruscans the arts of augury and divination, and was said to have sprung forth from a clod of earth freshly turned up by a husbandman named Tarchon, in the neighborhood of Tarquinii.

TAGLIA, n. *tăl'yá* [It. *taglia*, a pulley]: in *mech.*, the name given to a system of pulleys, one set being in a fixed block, and another in a movable block to which the weight is attached.

TAGLIONI, *tâl-yō'nē*, MARIA: Italian ballet dancer: b. Stockholm, Sweden, 1804, Mar. 18, or Apr. 23; d. Marseilles, France, 1884, Apr. 23. Her father was Philippo Taglioni (b. Milan 1777; d. 1871), a ballet master at different opera-houses successively in Europe. She was rigorously trained by her father and developed a marvelous grace, so that she became the admiration of Europe in her day. She made her début at Vienna in 1822; appeared at Paris in 1827, and at Berlin, London, and other capitals later. Her style was termed 'ideal'; was chaste and refined in distinction to the 'realistic' dancing of her predecessors, Gardel and Vestris. Her great successes were *La Bayadire, La Sylphide,* composed for her by her father, and *La Fille du Danube.* In 1832 she was married to Count Gilbert de Voisins, and in 1847 retired from the stage. She is frequently mentioned in contemporary literature, particularly by Balzac and Thackeray.

TAGUS, *tā'gŭs* (Sp. *Tajo*): largest river of the Spanish Peninsula. It rises on the frontier of New Castile and Aragon, 5,225 ft. above sea-level; flows n.w. about 30 m. to its union with the Gallo, where it curves s.w. to Toledo, thence w. to Abrantes in Portugal. From Abrantes, its course is s.w., passing Lisbon, about 10 m. below which city it enters the Atlantic. At Peralejos, a few miles from its source, it is 12 in. deep, 15 paces broad, and confined between rocky walls 400 ft. high. At the city of Toledo, it breaks through a romantic rocky pass whose walls are more than 200 ft. high. From Villavelha, 18 m. within the Portuguese border, the Tagus is navigable to its mouth, 115 m.: for large vessels, navigation begins at Santarem, to which point the tide reaches. Above Lisbon, the river widens like an estuary, in some places 5 m. broad; opposite Lisbon, however, it is only 1 m. broad. The principal affluents are the Jarama, Guadarrama, Alberche, Alagon, and Zezere from the n., and the Guadiela and Rio del Monte from the s. Total length 566 m., of which 192 m. are in Portugal or on its boundary.

TAIHOKU: or as the Chinese call it TAIPEH, is the capital of the Island of Formosa, Japan, where the governor-general has his headquarters. The population, numbering 15,000 in 1905, consists mainly of Chinese, now Japanese subjects by naturalization. There are also a number of foreign residents. Taihoku is connected with the main towns and seaports of the island by railways. Commerce is in a fairly prosperous condition.

TAHITI, *tä-hē'tē,* formerly OTAHEITE: the largest of the Society Islands (q.v.), situated in the southern Pacific Ocean, in lat. 17° 40′ s., and lon. 149° 30′ w. It consists of two mountainous, volcanic, and roughly circular parts, united by a low, narrow neck of land, and abounding in magnificent scenery. The total area is 402 sq.m., and the highest point of the island is 7,320 ft. above sea-level. The climate is very agreeable. The natural vegetation is extremely beautiful and luxuriant, but cultivation is limited to the coastal plain, where also nearly all the population is located. Copra, pearl-shell, cotton, vanilla, and oranges are the chief exports. Papeete, on the n.w. coast, is the French administrative capital for all the French possessions in Polynesia. The native Tahitians were once a splendid race, noted for their simple, idyllic life. (See TAHITIAN LITERATURE.) The vices introduced by contact with civilization soon brought about moral and physical degeneration, and the native inhabitants are rapidly diminishing in number. The island was discovered by a Spanish navigator, Quiros, in 1605, and visited by Capt. Cook in 1769. In 1842 it came, as a native kingdom, under French protection, and in 1880 was declared a French colony. Pop. (1900) 10,750. See SOCIETY ISLANDS.

TAHITIAN LITERATURE: as mentioned under Tahiti, the natives of this southern Pacific island were once a beautiful race, living a natural, simple, and idyllic life, as expressed in the accounts of Tahiti by Wallis, Bougainville, Cook, and others, and idealized in the works of Melville, *Omoo* (The Rover); Stoddard, *Idylls;* and Loti, *Marriage.* Notwithstanding their physical and moral degeneration, since the introduction of European civilization, the evidences of the aboriginal state of existence, outside the recitals of early explorers, are to be found in their traditions and legends preserved in the native songs and poems of the existing Teva family, of royal lineage, descended from Hototu, first queen of Vaieri, who married Temanutunu, the first king of Punauia. The songs, generally of love, war, and lamentation, locally called *himenes,* are sung as a kind of choral chant with a monotonic buzzing bass, on which a high shrill cadencing is repeated indefinitely, ending always in a long iee-i-é-e. The longer poems recite the history of the family, the various forms of etiquette and addresses for visits; shorter poems consist of soliloquies, laments, reproofs, and ceremonial topics. Among favor-

ites of which English translations have been made are the *Coronation Song of Pomare; Lament of Aromaiterai; Soliloquy of Teura, a beauty asked to wed Punu, an old chief;* and *Song of Reproof,* at the beginning of the *Wars between Teva and Purionu, in 1768.*

TAHLEQUAH, *tâ'lē-kwâ:* a town, cap. of the Cherokee nation, Ind. Terr.; 1 m. from the Illinois river, 15 m. from the Missouri Pacific railroad, 45 m. n.w. of Fort Smith, Ark. It is surrounded by prairie-land on which large herds of cattle are raised; contains the national capitol, male seminary, female seminary, insane and blind asylum, several public schools, national penitentiary, and Baptist, Congregational, Methodist Episcopal, Moravian, and Presbyterian meeting-houses; and has 2 weekly newspapers. Pop. 2,000.

TAHOE, *tâ-hō',* LAKE: picturesque body of water intersected by the boundary-line between Cal. and Nev.; 3,000 ft. above sea-level; greatest length 21 m., greatest width 12 m.; estimated area 195 sq.m. It receives water from probably more than 100 streams of various sizes, the principal being the Upper Truckee river; and discharges solely through the Truckee river on the n.w. shore, whence the water passes through a mountain gorge, then n.e. through the plains of Nev., and into Pyramid Lake. In summer the climate is delightful, and the charm of the landscape is intensified by the beautiful hues and the remarkable transparence of the water; in winter the climate is of prolonged severity.

TAIKŌ-SAMA, *tī'kō-sâ'mâ* ('My lord the Taikō [or ex-premier],' title by which Toyotomi Hideyoshi, *tō-yō-tō'mē hē-dā-yŏsh'ĭ,* is generally known in Japanese history): Japanese warrior and statesman: 1538-98; b. in the province of Owari; son of a peasant. When a boy, he entered the service of Nobunaga as a groom, but distinguished himself as a soldier, and was soon advanced to important commands. In 1575 he was made Chikuzen no kami (lord of Chikuzen); 1586 became Kuambaku or premier (an office hereditary in the princely family of Fujiwara); 1591 resigned in favor of his adopted son, but still wielding the power, and assumed the usual title of ex-premier, Taikō or 'great noble.' He subdued the warring clans, expelled the Jesuit missionaries, crucifying many Christians, and prohibited Christianity—deeming the Jesuit influence subversive of the power of the mikado. In 1594 he undertook a needless invasion of Corea (but not in person), which, though at first successful, resulted in no permanent advantage; and on his death the army withdrew.

TAIL, n. *tāl* [Icel. *tagl,* a horse-tail: Sw. *tagel,* horse-hair: Goth. *tagl,* hair]: the part which terminates an animal's body; the hinder part of anything; a shoot or projection hanging loosely from the hinder part; the luminous train following the body of a comet; the bottom or lower part of anything; anything long and pendent; the

end or spent part, as of a storm; the reverse of a coin: V. to pull by the tail; in *arch.*, to fasten by one of its ends into a wall, with *in.* TAIL'ING, imp.: N. in *arch.*, the part of a projecting stone or brick inserted in a wall. TAILED, pp. *tāld:* ADJ. having a tail. TAILINGS, n. plu. *tāl'ĭngz*, the lighter parts of grain in winnowing. TAIL'LESS, a. *-lĕs*, having no tail. TAIL-BLOCK, in *ships*, a single block having a short piece of rope attached to it, by which it may be fastened to any other thing. TAIL-BOARD, the movable board at the back of a cart or wagon for convenience in unloading. TAIL-DRAIN, in *field-draining*, a main drain which receives the water running out of the other drains. TAILPIECE, a piece at the end; the end-piece of a violin to which the strings are attached; in *printing*, an ornamental design placed at the end of a chapter or division of a book. TAIL-RACE, the stream of water from a mill after it has turned the wheel. TO TURN TAIL, to run away.

TAIL, or TAILLE, n. *tāl* [F. *taille*, a cutting: It. *taglia*, a share, a portion (see TAILOR)]: limitation; abridgment. TAILAGE, n. *tāl'āj*, *literally*, a piece cut out of the whole—hence, a toll or tax. AN ESTATE TAIL, in *Eng. law*, partial estate cut or carved out of the fee-simple; an estate limited to a person and the heirs of his body, or to a person and the heirs-male of his body, or to some other class of heirs less extensive than the heirs at law. See ENTAIL.

TAILOR, n. *tāl'ėr* [F. *tailleur*, a tailor—from *tailler;* It. *tagliare*, to cut—from mid. L. *talĕārĕ*, to cut a shoot —from L. *talĕa*, a cutting, a stick]: one whose business it is to make men's outer garments: V. to work as a tailor. TAIL'ORING, imp.: N. the business of a tailor. TAIL'ORED, pp. *-ėrd.* TAIL'ORESS, n. *-ĕs*, a female who makes men's garments.

TAILOR-BIRD (*Orthotomus*); genus of birds of family *Sylviidæ*, with long graduated tail whose feathers are narrow. The species are numerous, natives of the E. Indies and of the Indian Archipelago, and frequent cultivated grounds, where they are seen usually in pairs. Their flight is rapid and undulating, and they seldom ascend above the lower branches of trees. The name is derived from mode of forming the nest: two leaves are taken at the extremity of a twig, and are sewed together by their edges, or a large leaf is bent and sewed together; the necessary holes being made by the bill, and vegetable fibres forming the thread. Within the hollow thus made, a cottony substance is placed to receive the eggs.

TAILZIE, n. *tāl'yĭ*, or TAIL'YIE, n. *-yĭ* [F. *tailler*, to cut (see TAILOR)]: in *Scots law*, ancient term corresponding with the Eng. *Entail* (q.v.): any deed by which the legal course of inheritance is cut off and an arbitrary one substituted: V. to entail.

TAINAN, *tī'nân':* Formosa, Japan, a city situated on a small river near the s.w. coast of the island. Its nearest port is Anping, but it has railroad connection with the port of Takow. Pop. 44,000.

TAINE, *tān,* HIPPOLYTE ADOLPHE: distinguished French critic: 1828, Apr. 21—1893, Mar. 5: b. Vouziers. He studied at Paris, where 1853 he obtained the diploma of *docteur ès lettres,* for two essays, *De Personis Platonicis* and *Essai sur les Fables de Lafontaine.* They were followed by his *Essai sur Tite Live* (1854), crowned by the French Acad.; *Les Philosophes Français du dix-neuvième Siècle* (Paris 1856); *Essais de Critique et d'Histoire* (Paris 1857); *Histoire de la Littérature Anglaise* (Paris 1864); *Philosophie de l'Art* (1865; Eng. transl.); *Notes sur l'Angleterre* (1871; Eng. transl.); and others. In *Littérature Anglaise* (Eng. transl., Edinburgh 1872), the author surveys and criticises the whole Eng. literature from a point of view which is conceived to be rigorously scientific. According to Taine, there are three things to be borne in mind when writing the history of a nation's literature: first, the *race* to which the nation belongs; second, its *position* both geographical and in civilization in the different phases of its literary development; third, the *period* or duration of these. Under this view, the history of literature assumes the character of psychological problem. Among Taine's recent works is *Les Origines de la France Contemporaine,* of which vol. I., *L'Ancien Régime,* appeared 1875; II., *La Revolution,* 1878; III., *La Conquête Jacobine,* 1881; IV., *Le Gouvernement Revolutionnaire,* 1885. Vol. I. of *The Modern Régime* appeared 1890. Taine became a member of the Acad. 1878.—Taine is esteemed widely as an exceedingly instructive writer, one of the most brilliant of our times; but has been more or less under ban in his own country, as well as elsewhere, in regard to some of his materialistic and atheistic tendencies. The *Essai sur Tite Live* defended the system of Spinoza, and his *Les Philosophes Français* was anti-spiritual.

TAINT, n. *tānt* [F. *teint,* a stain—from F. *teindre;* L. *tingĕrĕ,* to tinge, to color]: a touch of corruption; a stain; a tincture; a blemish; infection; corruption: V. to defile; to contaminate; to impregnate with anything corrupt or foul; to sully; to be slightly infected or corrupted. TAINT'ING, imp. TAINT'ED, pp. TAINT'LESS, a. *-lĕs,* pure; free from infection. TAINT'LESSLY, ad. *-lĭ.* TAINT'URE, n. *-ūr,* tinge; defilement. TAINTWORM, in *OE.,* a certain kind of worm which taints or corrupts living or dead bodies.—SYN. of 'taint, v.': to stain; sully; infect; poison; disease; corrupt; tincture; deprave; spot; soil; blemish; pollute; vitiate.

TAIPINGS, *tī'pĭngs':* the name given by foreigners to the insurgent followers of Hung Hsiû-ch'wan, who raised a formidable rebellion in China in 1851 and who until his suppression in 1864, was looked upon by his disciples

as emperor of the dynasty of Taiping—signifying Grand Peace, and the T'ien Wank—Heavenly King, of the T'ien Kwo—Kingdom of Heaven. See CHINA, *History*.

TAIT, *tāt*, ARCHIBALD CAMPBELL, D.D., LL.D.: 1811, Dec. 22—1882, Dec. 3; b. Edinburgh: Anglican archbishop. He was educated at the Edinburgh Acad., Glasgow University, and Balliol College, Oxford; became a fellow, tutor, dean, and select preacher at the college; opposed the Tractarian movement 1841; was head-master at Rugby 1842-50; then became dean of Carlisle; and succeeded Dr. Blomfield as bp. of London 1856, Aug. In 10 years he raised $5,000,000 for erection of churches, schools, and parsonages in the suburbs of London. In 1868 he was appointed abp. of Canterbury, and primate of all England, succeeding Dr. Longley.

TAI-WAN-FOO, *tī-wán-fô'*: city, cap. of the island of Tai-wan, known to foreigners as Formosa; on a large plain 3 m. from the s.w. coast. It is a large straggling town, contains many park-like spaces with fine trees and green lanes, and is surrounded by a high battlemented wall 6 m. in extent. Its chief edifices are the residences of the mandarins, and the temples. The harbor of Tai-wan-foo, at Amping, is only a shallow open roadstead; trade is carried on only in five months of the year, cargo having to be carried in native boats. The chief export is sugar, which is grown all over the plain of Formosa; also rattan canes. About 27 m. s. is the harbor of Takao, headquarters of the customs staff; it is better than that of Amping.—Pop. of T.-W.-F., 120,000.—See 'Description of Formosa' in *Geographical Magazine*, 1877.

TAI-YUAN, *tī-yô-ân'*: city of China, province of Shan-si, on the Fuen-ho, affluent of the Hoang-ho; 250 m. s.w. of Pekin. It is said to be about 10 m. in circumference, fortified and populous. Porcelain, iron-wares, and carpets are manufactured.

TAJ MAHAL, *tâzh ma-hâl'*, India: a celebrated mausoleum in the beautiful garden, outside the city of Agra, about 1 m. e. of the fort. It was built by the Emperor Shah Jehan for himself and his favorite wife Mumtaz Mahal, who died in 1629. Tavernier, who saw the building in process of construction, says that 20,000 men were employed upon it continually for 22 years. It is an octagonal building 70 ft. high, with sides measuring 130 ft.; and is surmounted by a dome giving an additional height of 120 ft.; total height, 190 ft. At the four corners of the platform centred by the mausoleum are minarets 133 ft. high. The whole is built of white marble, and the interior decorations are of sumptuous magnificence. The screen surrounding the chamber containing the cenotaphs of the emperor and his consort, above the sepulchral vault, is composed of 12 kinds of stones, chief of which is the valuable lapis lazuli; the arabesque mosaic, and inlaid work is described as of unsurpassed

beauty. The cost of the mausoleum is variously estimated to have been from $10,000,000 to $50,000,000.

TAJURA, or TAJURRAH, East Africa: a bay and seaport in the French Somali coast protectorate or territory of Obok, on the Gulf of Aden. The rising French seaport of Jibutil is at the entrance of the bay, on the s. side, whence a railway extends since 1902 to Harar. See ABYSSINIA.

TAKAMATSU, *tâ'kâ-mât-sô*, Japan: the capital of the prefecture of Kagawa, situated on the n. coast of Shikoku. Pop. 34,416.

TAKAOKA, *tâ-kâ-ō'kâ*, Japan: a town in the prefecture of Toyama near the west coast of central Hondo. It manufactures dyes and hardware. Pop. 31,490.

TAKASAKI, *tâ-kâ-sâ'kē*, Japan: a town in the prefecture of Gumma, situated nearly in the centre of Hondo, n.w. of Tokyo, with which it has railroad connection. It has cotton and silk manufactures. Pop. 30,893.

TAKATA, *tâ-kâ'tâ*, Japan: a town in the prefecture of Niigata, near the w. coast of central Hondo. It has extensive manufactures of cotton goods. Pop. 20,315.

TAKE, v. *tāk* [Icel. *tak*, grip, hold; *taka*, to seize: Sw. *tag*, hold: Dut. *tacken*, to touch: L. *tactus*, touched; *tangĕrĕ*, to touch]: to obtain in almost any manner; to receive in any temper or disposition of mind; to support; to receive in thought; to lay hold of; to seize; to make prisoner; to entrap; to swallow; to understand in a particular sense or manner; to use, as an oath or expression; to captivate with pleasure; to engage; to use or employ; to procure; to turn to; to choose; to get into, as to *take* the water; to have recourse to, as to *take* to a tree; to pursue or follow, as a course; to perform; to leap or jump over; to copy or paint, as a likeness; to change with respect of place, as he *took* out his hand; to hire or rent, as a house; to enter upon, as a campaign; to conquer, as a fortress; to close in with; to comply with; to separate for one's self from any quantity; to please; to fasten on; to gain reception; to have a tendency to; to catch; to be fixed; in *OE.*, to blast; to infect; admit; to receive payments: N. a catch, as of fish at one haul or catch; in *printing*, a quantity of copy given to a compositor. TA'KING, imp.: ADJ. alluring; attracting; N. the act of receiving or gaining possession; capture; in *OE.*, distress of mind. Took, pt. *tûk*, did take. TAKEN, pp. *tā'kn*. TA'KER, n. *-kėr*, one who takes. TA'KINGNESS, n. the quality of pleasing. TO TAKE ADVANTAGE OF, to catch by surprise; to make use of convenient circumstances to the prejudice of. TO TAKE AFTER, to imitate; to be like. TO TAKE AIM, to direct the eye or weapon. TO TAKE ALONG, to carry, lead, or convey. TO TAKE ARMS, to commence war or hostilities. TO TAKE AWAY, to remove; to deprive of. TO TAKE BREATH, to cease or stop, as from labor, in order to breathe or rest. TO TAKE CARE OF, to

have the charge or care of; to superintend. To TAKE DOWN, to remove from a high position; to reduce; to pull down; to snub; to reduce to writing. To TAKE EFFECT, to be efficacious; to come into operation. To TAKE FIRE, to become ignited. To TAKE FOR, to suppose to be some other person or thing. To TAKE FROM, to deprive of; to deduct; to detract. To TAKE HEART, to gain confidence or courage; to be encouraged. To TAKE HEED, to be careful or cautious. To TAKE HEED TO, to attend to with care. To TAKE HOLD OF, to seize. To TAKE HORSE, to mount and ride a horse. To TAKE IN, to inclose; to comprise; to contract; to furl; to cheat; to admit; to receive mentally; to receive regularly, as a periodical. To TAKE IN HAND, to undertake. To TAKE LEAVE, to bid adieu or farewell. To TAKE NOTICE, to show signs of mental growth, as an infant; to observe with particular attention; to make remarks. To TAKE OFF, to remove; to cut off; to destroy; to swallow; to imitate or mimic; to purchase; to copy. To TAKE ON, to assume; to take upon one's self; to be violently affected; in *OE.*, to claim a character; to grieve; to pine. To TAKE OUT, to remove from within; to extract. To TAKE PART, to share. To TAKE PART WITH, to unite with; to join with. To TAKE PLACE, to happen. To TAKE ROOT, to live and grow, as a plant. To TAKE STOCK: See STOCK-TAKING, under STOCK 2. To TAKE TO, to be fond of; to become attached to; to resort to. To TAKE UP, to lift; to commence; to purchase or borrow; to engage the attention; to seize or arrest; to begin where another has left off; to occupy; to assume or carry on; to pay and receive, as a bill of exchange. To TAKE UP WITH, to become familiar with; to lodge or dwell with; in *OE.*, to be content with. To TAKE UP ARMS, to begin war. To TAKE THE AIR, to walk or ride in the open air for exercise and health. To TAKE THE FIELD, to enter upon a campaign; to begin open war. To TAKE TO HEART, to feel sensibly or keenly. To TAKE UPON, to assume; to undertake. To TAKE WITH, to please. TAKING UP, a general term which signifies the making of adjustments for wear. Specifically, it denotes the closing up of strap ends of connecting rods, the cone bearings of lathes, compensating collars, etc., and signifies the smooth working of bearings and moving parts, rather than to the tightening of parts which are either bolted or wedged together.—SYN. of 'take, v.': to receive; seize; catch; snatch; charm; engage; entrap; exact; get; have; appropriate; use; employ; adopt; procure; practice; form; fix; admit; suffer; follow; pursue; swallow; convey; carry; transport; accept; separate; allow; admit; endure; bear; draw; derive; leap; assume; suppose; withdraw; comprise; comprehend; produce; hire; rent, incur; please.

TALACOGAN, *tâ-lâ-kō'gân,* Philippines: a settlement of Moros, province of Surigao, Mindanao, on the Agusan river, 7 m. n. of the outlet of Lake Pinayat, and 96 m. s. of Surigao, the provincial capital. Pop. 11,590.

TALAMANCA, *tâl-â-mân'kâ,* Panama: a name formerly applied to the Atlantic coast region of w. Panama and Costa Rica. At the time of the discovery the region was inhabited by numerous tribes with a peculiar civilization of their own. They manufactured a great variety of ornaments of gold, in which the country was very rich. By the encroachments of the whites they were driven into the forest and mountain recesses. Here a tribe known as Talamancans still lives in practical independence and wholly unaffected by modern civilization, within a short distance of the Panama railroad.

TALARIA, n. plu. *ta-lā'rĭ-a* [L.—from *talus,* an ankle]: in *class. antiq.,* the small wings attached to the ankles of Hermes or Mercury in representations of that deity.

TAL'AVACHI: a mysterious poison, formerly manufactured by the Aztecs, and by them handed down to the Mexican Indians. Skilfully administered, it is said to destroy the mind while leaving slight effects on the body. The peculiar effect of the poison seems to be to induce monomania or epilepsy.

TALAVERA DE LA REINA, *tâ-lâ-vā'râ dā lâ rā'ē-nâ:* town of Spain, in New Castle, in the modern province of Toledo; charmingly situated on the Tagus, 75 m. s.w. of Madrid. It is ancient, straggling, dirty, and inconvenient; is surrounded by remains of interesting old walls, and abounds in antique fragments. It was formerly a flourishing town; but of its manufactures only that of silk is now carried on. Fruits are extensively produced in the vicinity. Here, 1809, July 27, 28, Sir Arthur Wellesley, with 19,000 English and German troops, and about 34,000 Spaniards, who, however, were scarcely at all engaged, defeated more than 50,000 veteran French troops, under Joseph Bonaparte and Marshals Jourdan and Victor.—Pop. 12,000.

TALBOT, n. *tawl'bŏt* [said to be after the *Talbot* family, whose arms contain the figure of a dog]: hunting-dog, of pure white color, with very broad muzzle, deep chops, and long pendulous ears. The name was originally probably equivalent to Bloodhound, but afterward applied to a race of hounds, now extinct or nearly so, which seem to have been kept for show rather than for use.

TALBOT, *tawl'bot,* JOHN: non-juring Anglican bishop: 1645-1727, Nov. 29; b. Wymondham, England. He was educated at Cambridge, and became rector at Freetherne. As ship-chaplain 1702, he became acquainted with missionaries sent out from England; and offered himself and was appointed to like service, for 20 yrs. officiating with faithful effort in St. Mary's Chh., Burlington, N. J. Failing to procure the appointment of a bishop from the mother country, and deeming the need very great, he went to England, and was consecrated secretly by non-juring bishops. Two years after his return in 1722, his claim

was made known, and he was by order of govt. prohibited from officiating, he himself being a non-juror (see NON-JUROR). In 1875 his episcopal seal was found, and a large copy in brass affixed to a tablet in St. Mary's Church, Burlington, N. J.

TAL'BOT, SILAS: brilliant naval captain in the revolution: 1751-1813, June 30; b. Dighton, Mass. With commission of captain from the state of Rhode Island, he was among the first in the war. After the transfer of operations from Boston to New York, he conceived and carried out the plan of sending a fire-ship from Ft. Washington against the enemy's fleet; this, though not very successful, brought him the thanks of congress and promotion to major. He had part in operations near Philadelphia, but his noted achievements were the taking of the schooner *Pigot*, eight guns, near Newport, his vessel being a small sloop; with this and a sloop he captured two other armed schooners and two privateers; also the brig *King George*, 12 guns, after a severe battle and boarding the brig; also the brig *Eliot* and the ship *Dragon*, in which last fight his speaking-trumpet and coat were pierced with shot. While becalmed, his own ship was taken; he was confined in the Jersey prison-ship, and sent to England in the hold of the *Yarmouth* in winter; but was exchanged 1781. After serving as state representative 1793-4, he was in command of the frigate *Constitution* and of a fleet in the W. Indies 1798, during the French hostilities. He received the thanks of congress repeatedly, and his last promotion was to captaincy in the navy. The scars of many wounds attested his bravery; and he carried five bullets, it is said, in his body. He died in New York, and was buried in Trinity churchyard.

TAL'BOT, WILLIAM HENRY FOX: known for inventions in photography: 1800, Feb.—1877, Sept. 17; only child of William D. T. of Locock Abbey, Wilts, England. He was educated at Harrow, and at Trinity College, Cambridge, where he obtained the junior chancellor's medal 1821. He was for a time in parliament, but turned from politics to chemical and optical science, busying himself with the problem of fixing shadows, unaware of what had been effected in this department by Wedgwood and Davy. He discovered for himself a method of obtaining and fixing sun-pictures; and on the public announcement of Daguerre's successes in the same field, secured his own rights by publishing a paper (*Phil. Mag.*, 1839, March) detailing the steps of his investigation and their result: see PHOTOGRAPHY. This process, by which a *Negative* was primarily obtained, was subsequently improved by his invention (patented 1841) of the Calotype process. Soon afterward he obtained fresh patents, for an 'instantaneous process,' a mode of 'photographic engraving,' and a 'polyglyptic process.' A later inven-

tion of his, patented 1858, was called by him Photoglyphic Engraving. In 1842 Talbot obtained the medal of the Royal Soc. for his discoveries. Latterly he applied himself to the study of general physics and to philological researches. Among his works are: *Hermes, or Classical and Antiquarian Researches; Legendary Tales; Illustrations of the Antiquity of the Book of Genesis;* and a work on *English Etymologies.*

TALBOTYPE, *tawl'bō-tīp:* photographic process, called by the inventor, William H. Fox Talbot, the Calotype process. Its essential features consist in the production in the camera of an image by light *on* the *surface* of chemically prepared paper; and this distinguishes it from other *paper* processes, and by consequence from other photographic processes.

TALC: one of the commonest and most important of the non-metallic minerals. It is usually massive or foliated, the laminæ being flexible but not elastic. It is number one in Mohs scale of hardness, and like most very soft minerals it has a greasy feel. Its lustre is pearly and glimmering, and its usual colors are green, gray or white, Foliated varieties are often quite transparent, while the massive is translucent. It is of average specific gravity, about 2.7. It is acid magnesium silicate $H_2Mg_3Si_4O_{12}$. Talc, like the related mineral serpentine, is of secondary origin, having been formed by the alteration of various magnesian minerals such as tremolite, pyroxene and enstatite. It occurs in metamorphic rocks all over the world, being the most prominent mineral in the rock known as talcose schist, and sometimes forms extensive beds, occurring thus in most of the Atlantic coast states. Although very soft it is almost indestructible, not being attacked by acids nor injuriously affected by intense heat. Its common, massive form, popularly known as 'soapstone,' is the 'steatite' of mineralogy. Some soapstone is, however, a massive pyrophyllite. Talc is used in the arts either powdered as 'flour talc,' or in sawed pieces. Flour talc is employed as a base for fireproof paints, in boiler and steampipe coverings, and foundry facings, for electric insulators, in the manufacture of dynamite, and of wall papers, to which it imparts a glossy surface; it is very extensively used in the manufacture of toilet powder (talcum powder), and cheap soaps, for dressing leathers and skins, and as a base for lubricants. About half a million dollars' worth of 'fibrous talc' is produced annually in the single county of Saint Lawrence in New York. This material is a mixture of talc and fibrous tremolite and is used in making paper. When ground the fibres cause the retention of the flour talc in the paper pulp, thus adding materially to the strength and weight of the paper. The supply of pure, compact soapstone, the most valuable variety of talc, comes largely from w. North Carolina and Virginia. It is sawed into slate pencils and crayons and is manufac-

tured into the tips of gas burners. The chief uses of soapstone are for stationary wash-tubs, sinks, acid tanks, hearthstones, fire bricks, mantels, griddles, and many other articles of everyday use. 'French chalk' is a fine-granular talc used as a crayon by tailors. In China and Japan a fine compact talc is carved into various ornaments, household gods and pagodas, though considerable of the material thus used is agalmatalite or pyrophyllite.

TALCA, *tâl'kâ,* Chile: the capital of the province of the same name, on the Rio Claro, about 150 m. s. of Valparaiso, on the railway from Curico to Concepcion. It is a fine city, with handsome churches and a lyceum. Weaving is the chief manufacturing industry. Pop. (1900) 40,987.

TALCAHUANO, *tâl-kâ-wâ'nō,* Chile: a seaport in the province of Concepion, situated 250 m. s. of Valparaiso, and 8 m. n. of the city of Concepcion, with which it has railroad connection. It has a lighthouse, a new custom-house, and large warehouses and docks. The harbor is being fortified. It is the principal export town for wheat in s. Chile. Pop. (1900) 15,376.

TALCOTT, *tawl'kot,* JOHN: one of the first settlers and magistrates of Hartford, Conn.: 1600-60; b. Braintree, England. He came to Boston 1632, two years after its settlement, in company with the Rev. Thomas Hooker; and with him and others founded the Hartford colony 1636. From that time until his death, he was its chief magistrate. His house was the first erected in that colony.—JOHN T., his son, 1630-88, b. in England, accompanied his father; was assistant magistrate while the colony was separate, also deputy and treasurer; and was one of the patentees in the royal charter of Connecticut 1662. He was a military officer of the colony; and he led an expedition against Indians, rescuing Hadley, Mass., from an attack, and making an effective campaign; he also fought the Narragansetts with success.—He was called the Indian fighter, and was appointed lieutenant colonel. He died in Hartford.

TALE, n. *tāl* [Dan. *tale;* Icel. *tala,* a speech: AS. *talu,* a number, narrative: Ger. *zahl,* number]: a story; a short narrative of adventure; a fiction; number told or reckoned; a numeral account; information; disclosure: V. to tell off in numbers. TAL'ING, imp. TALED, pp. *tāld.* TALE-BEARER, one who impertinently or officiously gives intelligence about the doings of others that may create mischief and ill-will. TALE-BEARING, officious or thoughtless information given about others that may create ill-will: ADJ. giving officious information. TALE-TELLER, one who relates stories generally for amusement.—SYN. of 'tale, n.': account; narrative; narration; description; record; relation; memoir; history; anecdote; fable; incident; legend; reckoning.

TALE, n. *tāl:* another spelling of TAEL, which see.

TALED, n. *tā'lēd* [Heb. *talith*]: in *Jewish antiq.*, a garment of fine linen with a fringe attached to it, worn by the Jews in Talmudic times: it was ample in size, to admit of the head being enveloped in it while its wearer engaged in prayer.

TALEGALLA, *tăl-ē-găl'la:* genus of Gallinaceous birds, of family *Megapodidæ;* having a strong, thick, and very short bill, upper mandible curved and pointed; head and neck almost quite naked; wings short and round; tail rather long, rounded on the sides; legs strong, feathered a little below the joint of the tibia and tarsus; tarsi covered with scales in front; toes long and strong; claws large and sharp. The species are natives of Australia and New Guinea. The best known is the BRUSH TURKEY (*T. Lathami*) of Australia, known also as WATTLED TALEGALLA and NEW HOLLAND VULTURE, about the size of a turkey, with blackish-brown plumage. It inhabits thickly wooded parts of New South Wales; it is shy, and when pursued endeavors to escape by running through the thickest *brush,* or by leaping to the lowest branches of a tree, from which it ascends branch by branch. It is easy game to the sportsman; and though several of a flock are shot, the rest keep their place undisturbed. Small flocks make their nests together, the males heaping up with their feet mounds of several cartloads of earth and decayed leaves, which are used from year to year, new materials being added. The eggs are hatched by the heat of the sun and of the fermenting mound, each egg being separately buried: the parent birds partially uncover them during the day. Nearly a bushel of eggs are sometimes found in a heap. The male bird gives great attention to the young after they are hatched, covering them up partially in the mound at night for warmth. The flesh of the talegalla is excellent; the eggs are also very delicate. It is thought that this bird might easily be added to the list of domestic poultry in Europe and America.

TALENT, n. *tăl'ĕnt* [F. *talent,* a talent weight, ability—from L. *talen'tum;* Gr. *talan'ton,* a thing weighed]: among the *ancients,* a weight, or a sum of money, varying in amount—the Jewish, of silver, about $1,900; of gold (one-sixth less in weight), about $22,000: in metaphorical use, as in the Scripture parable of the talents (Matt. xxv.), natural gift, or endowment; eminent ability; particular faculty. TAL'ENTED, a. possessing skill or talents; mentally gifted.—SYN. of 'talent': genius; skill; ability; capacity; capability; cleverness; faculty; gift; endowment.

Talent was a word used by Homer to denote both a balance, and a weight of some monetary currency; and was probably only a shekel, or $\frac{1}{3000}$ or $\frac{1}{3600}$ of the Assyrian talent, which weighed about 65 lbs. 5 oz. avoirdupois and was divided into 60 minas, and each mina into

60 shekels. The Talent, though called by a Greek name, was undoubtedly of Assyrian origin and was introduced into Greece by Phœnician merchants. It never was a coin. The first Hellenic Talent was the old Æginetan (88 lbs. 12 oz. avoirdupois); this was followed by the Eubœan (or Later Æginetan), equal to 80 lbs. 4 oz. The standard Talant of Solon, which later came into general use throughout the Hellenic world as the Attic Talent, was equal to 56 lbs. 14 oz.; as a denomination of silver money, the Attic Talent was equal to about $1,000. The 'great Talent' of the Romans is computed to have represented a value (in our money) of about $480; and the Roman 'little Talent' a value of about $363; their weights are not known.

TALES, n. plu. *tā'lēz* [plu. of L. *tālĭs*, such]: in *law*, at a trial, qualified men who happened to be present, taken, by permission of the judge, to make up the insufficiency in the number of the jurors, occasioned by challenges or other causes.

TALFOURD, *tawl'fėrd*, Sir THOMAS NOON, D.C.L.: 1795, Jan. 26—1854, Mar. 13; b. near Stafford, England: jurist and author. He was educated in a dissenting grammar school; studied law with Chitty; was called to the bar 1821; was member of parliament 1835-41 and 1847-49; and in the latter year was appointed a judge of the common pleas. He published many speeches, essays, critical and poetic and dramatic works, including *Poems on Various Subjects* (1811); *History of Greek Literature; History of Greece; History of the Roman Republic; Memoirs and Correspondence of Charles Lamb* (1837); and the tragedies *Ion* (1835), *The Athenian Captive* (1838), *Glencoe* (1840), and *The Castilian* (1854).

TALIAFERRO, *tŏl'ĭ-vėr*, BENJAMIN: revolutionary soldier: 1750-1821, Sept. 3. He was a member of Morgan's rifle corps, and distinguished himself at the battles of Saratoga, Monmouth, and at the siege of Savannah; aide to Gen. Lincoln at Charleston 1780, and taken prisoner at its surrender in May. In 1784 he settled in Georgia; was a delegate to the Georgia constitutional convention 1798; a representative in congress 1799-1802, and later president of the state senate, and a judge of the superior court of the state. He died in Wilkes co., Ga.

TALIAFERRO, *tŏl'ĭ-vėr*, WILLIAM BOOTH: military officer: b. Belleville, Va., 1822, Dec. 28; d. 1898, Feb. 27. He graduated at William and Mary College 1841; entered the U. S. army as captain 1847, Apr. 9; was promoted major Aug. 12 following; and was mustered out 1848, Aug. 26. He was a democratic presidential elector 1856, and member of the state legislature for 10 years. In 1861, May, he was appointed colonel in the Virginia provisional army; 1862, major, brigadier-general in the

Confederate army; and 1865, Jan., major-general. He was in the principal movements of the Army of N. Virginia, 1861-2, commanded the defenses on Morris Island, S. C., 1863, July, and on James Island, Aug.; and afterward commanded the district of South Carolina. After the war he was connected with some leading educational institutions in Virginia.

TALIESIN, *tăl'ĭ-sĭn* (interpreted 'Splendid Forehead'): Welsh bard, surnamed *Pen Beirdd*, 'chief of the bards': assigned by some writers to the 5th century, by some to the 6th, by others as late as the 12th century. Nothing is definitely known about him; but many poems supposed to have been written by him are preserved in the *Archæology of Wales*. See WELSH LANGUAGE AND LITERATURE.

TALIPED, n. *tăl'ĭ-pĕd*, or TAL'IPES, n. *-pēz* [L. *tālus*, an ankle; *pes* or *pĕdem*, a foot]: scientific name for the disease called Club-foot (q.v.): the term *taliped* denotes also a person affected with club-foot.

TALIPES: club-foot. There are several varieties of talipes, according as the deformity is one of extension or flexion, of eversion or inversion. In *talipes equinus* the heel is raised and the person walks upon the toes; the opposite condition is *T. calcaneus*, in which only the heel touches the ground; in *T. varus* the outer margin of the foot alone rests upon the ground; in the opposite condition, *T. valgus* (flat-foot), the person walks upon the inner border of the foot. The most common form of club-foot is *T. equino-varus*, in which the foot is extended and inverted, the person walking upon the anterior and outer part of the foot; in extreme cases of this deformity the foot is so twisted that the dorsum (upper surface) of the foot rests upon the ground. Other combinations are *T. equino-valgus*, *T. calcaneo-varus*, and *T. calcaneo-valgus*.

TALIPOT, *tăl'ĭ-pot* (or TAL'IPUT, *-pŭt*) PALM, or GREAT FAN PALM (*Corypha umbraculifera*): noblest palm of the East Indies, native of Ceylon, Malabar, etc. It grows to the height of 60, 70, or even 100 ft.; and has a straight cylindrical trunk, crowned with a tuft of enormous palmate plaited leaves, which are divided near the outer margin into numerous segments, and are united to the trunk by spiny leaf-stalks. The leaves are usually about 18 ft. long, exclusive of the leaf-stalk, and 14 ft. broad; a single one being sufficient to protect 15 or 20 men from rain. At the age of 30 or 40 years, the tree flowers, and after ripening fruit generally dies. It produces a long, conical, erect spadix, rising 30 ft. from the midst of its crown of leaves, and dividing into simple alternate branches, the lower of which sometimes extend laterally 20 ft., the whole covered with whitish flowers and forming a beautiful and magnificent object. The fruit is very abundant, globose, and about an inch and a half in diameter. The leaves are used for covering

houses, for making tents, and for many other purposes. On occasions of ceremony, every Singhalese noble is followed by an attendant, who carries above his head a richly ornamented talipot palm leaf, which is capable of being folded up like a fan, and is then not thicker than a man's arm, and wonderfully light. The leaves of this palm are used in Malabar for writing upon, characters being traced on them with an iron style. They are prepared for this purpose by boiling, drying, damping, rubbing, and pressing. The soft central part of the stem, pounded and made into bread, has often been of great use in times of scarcity.

TALISMAN, n. *tăl'ĭs-măn* [F. and Sp. *talisman*—from Ar. *tilsam*, a magical image—from Gr. *telesma*, tribute, in late Gr. incantation, mystery—from Gr. *telos*, completion]: among *eastern nations*, a kind of charm, consisting of some magical figure engraved on metal or stone when two planets are in conjunction, or when a star is at its culminating point, and supposed to exert some protective influence over the wearer of it. Talisman, in popular usage, is any object which can be carried about the person, endowed with certain imaginary influences or powers, as protective from evil; an amulet. The terms talisman and amulet are often considered nearly synonymous; but the proper distinctive peculiarity of the talisman is its astrological character. Talismanic virtues have often been attributed to a peculiarly marked or formed egg; and instances are recorded, by various authors, of eggs hatched with (supposed) figures of comets or eclipses on them. A species of talisman which has acquired celebrity is the Abraxas Stone. A kind of talisman now in use in Asia is a piece of paper on which the names of the Seven Sleepers and their dog are inscribed: pasted on the walls of houses, this is believed to be a protection against ghosts and demons. TAL'ISMAN'IC, a. *măn'ĭk*, or TAL'ISMAN'ICAL, a. *-ĭ-kăl*, magical; having the properties of a talisman. TAL'ISMAN'ICALLY, ad. *-lĭ*.

TALK, n. *tawk* [Bav. *dalken*, to dabble, to speak imperfectly: Sw. *tolka*, to explain: Low Ger. *talk*, a daw, a tattling woman; Swiss, *talen*, to speak imperfectly (see TALE and TELL)]: conversation; familiar speech; subject of conversation; rumor; report: V. to speak, as in familiar conversation; to converse; to confer; to reason; to reprove gently; to influence with talk; to advise; to speak impertinently; to relate; to give account of. TALK'ING, imp.: ADJ. given to talking; loquacious: N. conversation. TALKED, pp. *tawkt*. TALKER, n. *tawk'ĕr*, one who talks; a loquacious person; a boaster. TALK'ATIVE, a. *-ă-tĭv*, fond of talking; loquacious. TALK'ATIVELY, ad. *-lĭ*. TALK'ATIVENESS, n. *-nĕs*, the quality or condition of being talkative; loquacity. TO TALK SHOP, to discuss matters concerning one's own trade or business where inappropriate.—SYN. of 'talk, n.': conversation; colloquy;

chat; discourse; conference; dialogue; communication; garrulity; loquacity.

TALL, a. *tawl* [perhaps from W. *tal*, tall, lofty]: high in stature; long and erect; high; lofty; in *OE.*, sturdy; lusty; bold; courageous; valiant; warlike. TALL'NESS, n. *-nĕs*, the state or quality of being tall; height of stature. TALL TALK, in *Amer. slang*, boastful and extravagant language.

TALLADEGA, *tăl-a-dē'ga:* Alabama, city, county-seat of Talladega co.; on the Southern, the Birmingham and A., and the Louisville and Nashville railroads; about 20 m. e. of Birmingham, and 70 m. n. of Montgomery. In the place where the city now stands Gen. Jackson had an encounter in 1813 with a large band of Cherokee warriors. Jackson was victorious. The city is in a fertile agricultural region, in which there is also considerable mining. The chief industrial establishments are a cotton factory, machine shop, tannery, and grist mill. There is considerable trade in grain and cotton. The educational institutions are the Isbell Female College, Talladega Military Academy, Alabama Academy for the Blind, Alabama School for the Deaf Mutes, Alabama Institution for Deaf, Dumb and Blind Colored Children, Talladega College (colored), opened in 1869 under the auspices of the Congregational church, and public schools. There are several churches and one orphanage. The two national banks have a combined capital of $125,000. Pop. (1910) 5,854.

TALLADEGA COLLEGE: located at Talladega, Ala. It is open to all persons without regard to color or race, but is practically for the education of the negro race, and its work is arranged to meet their needs. It was founded in 1867 by the American Missionary Association (Congregational), aided by the Freedmen's Bureau; and was the first college open to colored pupils in Alabama; the charter was obtained in 1869. A farm was bought in 1877, additions to it were made in 1887, and 1902 until the land owned by the college includes about 800 acres. The college is coeducational and aims to secure the best development of social character by the association of students of both sexes under the same general discipline and careful supervision. The college organization includes the following departments: (1) the theological department; (2) the college department; (3) the college preparatory department; (4) the normal department; (5) the grammar and lower grades; (6) the department of vocal and instrumental music; (7) the industrial department. The theological department offers three courses, the classical course including the study of the Bible in Hebrew and Greek, leading to the degree of D.D., the English course, the same as the classical without the study of the Bible in the original languages; the Bible training course, of two years, including almost entirely special study of the Bible with-

out the other studies of the usual theological course. The college department offers two courses, the classical and the scientific, leading to the degrees of A.B. and B.S. The college buildings are situated on high ground about half a mile from the city; they include Swayne Hall (the main college building); Graves Hall (theological building); Foster Hall (women's dormitory); Stone Hall (men's dormitory); Cassedy School (primary and intermediate grades); Foy Cottage (girls' industrial house); the Slater Shop (for boys' industrial work); and the De Forest Memorial Chapel (erected 1903-4); also the laundry, printing office and houses for teachers. The library contains 10,000 volumes; the students number 610 and the faculty 24.

TALLAGE, n. *tăl'lāj*, or TAL'LIAGE, n. *-lĭ-āj*, or TAILAGE, n. *tāl'āj* [F. *taillage*—from *tailler*, to cut (see TAILOR)]: impost; excise. In its more proper and restricted sense, it denotes those taxes to which, under the Anglo-Norman kings, the demesne lands of the crown and all royal towns were subject, which were far more rigorous and irregular than the taxes imposed on the gentry. TALLAGE, v. to lay on a tax or impost.

TALLAHASSEE, *tăl-a-hăs'ē:* city, cap. of Leon co. and of the state of Fla.; on the Florida Central and Peninsular railroad; 26 m. n. of the Gulf of Mexico, 160 m. w. of Jacksonville, 230 m. e. of Mobile. The prominent institutions of Tallahassee include the Florida State College and the Florida Normal and Industrial College (for colored); also the Leon County Academy. There are several libraries, and churches, six of the latter being for colored congregations. The industries of Tallahassee, which is in a farming, cotton, tobacco, and sugar region, include cotton compressing, cotton-seed oil, cigar and ice manufacturing. Pop. (1900) 2,981; (1910) 5,018.

TALLAPOOSA, *tăl-a-pô'sa:* town in Haralson co., Ga.; on the Georgia Pacific railroad and the Piedmont plateau; 63 m. w. of Atlanta, 1,200 ft. above sea-level. It is surrounded by picturesque hills and valleys, is a natural sanitarium for winter and summer resort. The Piedmont range abounds in rich iron ores, specular and manganese. It is the only region besides the Lake Superior and an undeveloped tract in Arkansas, where steel-making and Bessemer ores can be obtained in large quantities. There are large vineyards near by. The culture and shipping of grapes is a special feature of local operations. Fine forests abound near Tallapoosa, which is in an agricultural region. The town contains churches and schools, and has electric light and gas plants; waterworks; cotton-goods and furniture factories; planing and saw-mills; brick-yards; sash, blind, and door, broom, and wagon factories; cotton-knitting and cotton-hosiery mills; 1 state bank (cap. $50,000); and 1 weekly newspaper. Pop. 2,180.

TALLEYRAND DE PÉRIGORD, *tăl'lĭ-rănd*, F. *tâ-lā-rŏng' dĕh pā-re-gor'*, CHARLES MAURICE, Prince of Benevento: the most subtile, shrewd, and unprincipled of all modern diplomatists: 1754, Feb. 2—1838, May 17; b. Paris, of ancient and distinguished family; son of Charles Daniel, Comte de T. (1734–88), officer in the army of Louis XV. T., being the eldest son, would probably have entered on a military career, had not an accident in infancy lamed him for life. He was, in consequence, deprived of his right of primogeniture; was intrusted to strangers for his bringing up; and was trained for the priesthood, studying at St. Sulpice, the Sorbonne, and Rheims. He despised his enforced profession, using it only as an aid in his ambition, and never showing the least inclination toward a Christian or even a moral life. Yet he always held the study of theology in high estimation as a training for a public career. At the age of 20 he came to Paris, and rapidly acquired a reputation for licentiousness; though this did not prevent his obtaining several ecclesiastical benefices—among others, the abbacy of St. Denis, in the diocese of Rheims (1775). Appointed *agent-général* for the clergy 1780, a lucrative and important post, which brought him into close connection with the heads of the administrative in France, he began a serious apprenticeship to public business, without, however, pausing in his career of gallantry. So notorious was his *infâme conduite* (as Mirabeau calls it), that for years Louis XVI. shrank from conferring on him further ecclesiastical preferment; but 1789, Jan., he was made bp. of Autun. When the convocation of the *États généraux* took place, in the year following, he was elected by the clergy of his diocese to represent it, and pronounced in favor of an amalgamation with the *Tiers Etat*, which, June 17, had constituted itself the *Assemblée Nationale*. His attitude and speeches recommended him to the popular party, and with Mounier, Sieyès, and Lally-Tollendal he was appointed to draw up a constitution for the nation. In this capacity he was active in framing the famous Declaration of Rights, and he was one of those selected (after the destruction of the Bastile) to investigate the causes and peculiar features of the revolutionary movement. It was T. who proposed (1789, Oct. 10) the startling measure for confiscation of church property, arguing that such property belonged really to the nation, and that, if the rights of the existing clergy were secured, the nation, or its representatives, were at liberty to apply it to any purpose they saw fit. 1790, Feb. 13, a decree for suppression of religious orders was carried, in spite of vehement opposition, and three days later T. became pres. of the assembly. He was one of the first among the bishops to take the oath to obey the constitution, and urged the clergy of his diocese to follow his example; also, he consecrated two new bishops chosen by the assembly. For his action the pope excommunicated him; and he immediately abandoned his clerical profession.

T. had important share in the financial deliberations of this first period of the Revolution. Specially notable was

his sagacity in pointing out the perils attending the issue of assignats; his skill in preparing the way for the adoption of the principle of uniformity in weights and measures, and of an arc of a meridian as the basis of the new metrical system; and above all, the luminous intelligence shown in the Report which he gave in to the assembly, 1791, Sep. 10, 11, on Public Instruction—a Report conceived in the liberal and comprehensive spirit of the times, and which gave the model followed in all the great subsequent changes when France reorganized her educational system. Indeed, T.'s magnificent scheme, with slight modifications, is the French system to-day.

In 1792, when the old European despotisms were obviously preparing to coerce the young republic, T. was sent to London—though not in an openly official character—to negotiate with the English government. He did not make a favorable impression on George III. or on Pitt. Thrice, in that year, he essayed to procure a recognition of the republican govt., but in vain. The 'September massacres' (see SEPTEMBRISTS) made even the stanchest British admirers of the Revolution shudder. Nothing, therefore, could be done; and T. would doubtless have returned to France, had not a letter of M. de Laporte, *intendant* of the civil list of Louis XVI., been discovered, in which T. was noted as a man 'disposed to serve' the king. He was immediately placed on the list of *émigrés*, i.e., proscribed (1792, Dec.); thus his connection with the Revolution—fortunately, we believe, for his reputation—was suddenly ended. His career as an exile, was one of hardship and insignificance. He remained in England till forced to leave by the 'Alien Bill,' when, with a letter of introduction from Lord Lansdowne to Washington, he sailed for the United States (1794, Feb.), where he remained more than a year. After the fall of the Terrorists, he procured the revocation of his banishment; and 1796, Mar., reëntered Paris, having paved the way for a favorable reception by a series of adroit and judicious intrigues. He was received with enthusiasm in fashionable circles; and in private life he continued to play the *rôle* of a gay Lothario.

T. attached himself to the *cercle constitutionel* that gathered round Madame de Staël; and so dexterously did he comport himself, that, 1797, he was named minister of foreign affairs in place of C. Delacroix. The rise of Bonaparte was a phenomenon which so penetrating a politician as T. could not fail to see in its beginning. He cultivated the friendship of the young general with sagacious assiduity, keeping him constantly *au courant*, when away from Paris, of the situation of parties; and became his confidant in those designs, whose execution resulted in the overthrow of the Directory, Brumaire 18 (1799, Nov. 9). After this *coup d'état*, the subtle finesse of T. was constantly in requisition. He divined, with miraculous cleverness, the ideas of Bonaparte, and his whole policy was directed to consolidate the power and authority of his master. In all the diplomatic negotiations that followed the victories of France under the consulate, he had the principal part:

but Bonaparte thoroughly understood his man, and T. was quite conscious, as M. Thiers remarks, that he could never impose on his superior. It was he who proposed the kidnapping of the Duke d'Enghien (q.v.); and it was by his instructions that the crime was consummated, in spite of the vehement opposition of Josephine, whose honest indignation led her to denounce him, as a *maudit boiteux* (cursed cripple). T. took active part in preparing for the establishment of the empire (1804); and when, in the following year, England, dreading a French invasion, formed a powerful European coalition against France, it was by the ingenuity of T. that it was partially broken up. To him, as much as to Napoleon, was owing the organization (1806) of the famous *Confederation of the Rhine* (q.v.), which so effectually served the ambitious designs of the emperor. In the negotiations that brought about this Confederation, he exhibited a truly Macchiavellian art. Napoleon was not ungrateful: T. was made a prince of the empire, receiving the principality of Benevento as an imperial fief.

When the views of the emperor in regard to Spain became apparent, T., who for more than a year had somewhat lost favor with Napoleon, came forward with a plan of his own, which, however, was not adopted; but his presence at the interview between Alexander and Napoleon at Erfurt (1808), proved that his influence was as yet undiminished. The ill success of the Spanish war (at first) induced T. to dubiousness in his approval of it; and this, with other disagreements, occasioned violent invectives on the side of his sovereign, to which the accomplished cynic (who retained to the last the manners of the old noblesse) replied only by the sarcasm: '*Quel dommage qu'un si grand homme soit si mal élevé!*' (What a misfortune that so great a man should have been so badly brought up!). T. declared in favor of the Austrian marriage; but already the *entente cordiale* between him and Napoleon was ruptured, and he began to look forward to a future in which his own schemes might be hostile to those of the emperor: in a word, he was meditating treachery. The victories of Wellington in Spain, and the reverses of Napoleon in Russia and Germany, widened the breach; and T. now only waited the decisive moment in which to ruin the cause of his master. He became the centre of a group of Parisian malcontents, whose influence grew with the advance of the allied armies, and finally communications were opened with the latter and with the Bourbons. It was T. who dictated to the senate the terms of the deposition of Napoleon; and on the restoration of the Bourbons, he became minister of foreign affairs in the first govt. of Louis XVIII. He was also head of the French legation in the celebrated Congress of Vienna; and at this period he rendered to France splendid services, most helpful in her time of humiliation. After the battle of Waterloo, and the second restoration, a coldness sprang up between him and the Bourbons, a strong party under Chateaubriand cordially hated him, and he was relieved of all his offices. He caballed to regain power, but in vain; and during the

reigns of Louis XVIII. and Charles X., he was merely a discontented senator, who never lost an opportunity of injuring the court and the government. After the July revolution, Louis Philippe employed him as ambassador at the English court, where he contrived to bring about a friendly feeling between the new monarchy and the English government. He died at Paris.

T. was not wise, nor great, nor good; but he was, almost without parallel, cunning, dexterous, and supple. He had a larger share than most men of what Carlyle calls 'vulpine understanding;' and if this world had been populated only by knaves and fools, the policy and principles of T. might have had perpetual triumph; but there were forces in the world, both intellectual and moral, of which he took no account, but which took account of him, and notwithstanding all his amazing cleverness allowed the great diplomatist to lapse into obscurity. T. was an 18th c. skeptic, over whom the Revolution had exercised little influence, while France, and indeed all Europe, had been roused into earnestness by the outburst; and when the first crude ideas of political liberty had found their true basis and begun their orderly development, this brilliant, subtle, unscrupulous intriguer had nothing to contribute toward realizing the new ideals, and sank out of sight.—T. left *Mémoires*, not to be published till 1890: they are (1892) in process of publication. For estimates of his character and policy, see *Mémoires Politiques* of Lamartine; *Histoire de Dix Ans* of Louis Blanc, where T. is rigorously criticised; *Mémoires* of Guizot; works by Mignet and Bastide; *Correspondance inédité du Prince T. et du Roi Louis XVIII.* (2 vols. 1881; Eng. transl. 1881), ed. by Pallain; Sir Henry Lytton Bulwer in *Historical Characters;* and Taine's lectures (1870).—The reader of historical notices of T. may wisely remind himself of the temptation to paint such a character in lines of too unmitigated blackness; while, on the other hand, such a man's statements regarding himself need corroboration by the evidence of his contemporaries.

TALLICOO'NAH OIL: see CARAPA.

TALLIEN, *tà-le-âng'*, JEAN LAMBERT: French revolutionist, and leader in the overthrow of Robespierre: 1769-1820, Nov. 16; b. Paris. He became notable in the beginning of 1792 as editor of a Jacobin journal, *L'Ami des Citoyens*, a friendly rival of Marat's *Ami du Peuple*. From this date, his influence over the lower orders of the city steadily increased. He was conspicuous in the events of Aug. 10, and in consequence received the appointment of sec. to the *Commune Insurrectionelle*. He promoted and afterward defended the massacres of September; and for his unscrupulous zeal was elected to the convention by the dept. Seine-et-Oise. There he became the apologist, if not the advocate, of Marat, denounced the minister Roland, urged with savage emphasis the condemnation of Louis XVI., and was eager for the ostracism and annihilation of the Girondists (q.v.). Toward the close of 1793, he was sent to Bordeaux, charged to destroy every trace of

the party that he hated. His career in the s.w. was a mixture of reckless cruelty and shameless vice. To the odious tyrannies of a proconsul, he added the luxurious profligacy of a satrap. Fortunately for his countrymen, a passion which he conceived for one of his victims, a woman of surpassing beauty, Madame de Fontenay (*née* Cabarrus), caused him to pause in his bloody course. He was called to Paris to account for this singular change, but satisfied his associates by paroxysms of patriotic vehemence, and 1794, Mar. 22, was chosen pres. of the convention. Robespierre, however, had penetrated T.'s character, and hated him for his insincerity and immorality, felt instinctively that he could not be trusted, and denounced him in the convention. T. recognized his danger; and, taking advantage of the reaction then beginning to show itself against the Terrorists (though himself one of the basest of the set), he dexterously rallied the Dantonists, Hébertists, and others against the rigorous government of Robespierre, St. Just, and Couthon, and brought about the events of the 9th Thermidor (1794, July 27), which caused the fall of the triumvirate. T. now became for a short time one of the most notable men in France; lent his aid to suppress the Revolutionary Tribunal and the Jacobin Club; and drew up the accusations against Carrier, Le Bon, and others of the Terrorists. But France could not long tolerate this affectation of virtue from one so infamous; and finally, 1798, May 20, he was forced to leave the Council of Five Hundred. Thereafter his career was insignificant. He accompanied Bonaparte to Egypt as *savant;* quarrelled with General Menou; and on his return to France was captured by an English cruiser, and brought to England, where the whig opposition was stupid enough to make a hero of him (1801). Soon afterward he returned to France, and was contemptuously dismissed as consul to Alicante by Talleyrand, outlived (in utter obscurity) the empire of Napoleon, and died at Paris, in abject poverty, supported in his last days by the heirs of the monarch for whose death he had inhumanly clamored.

TALLIS, *tăl'ĭs* (TALLYS, TALYS, or TALLISIUS), THOMAS: 'father of English cathedral music': about 1515–1585, Nov. 23. After being a chorister at St. Paul's and at the chapel royal, and organist at Waltham Abbey, he was appointed a gentleman of the chapel royal, and held that position during the reigns of Henry VIII., Edward VI., and Mary. He became the organist of that chapel on the accession of Elizabeth. His many compositions, all religious, are, of their kind, unexcelled, if not unequalled, and show that he was not only a master of counterpoint, as illustrated in his *Song of Forty Parts,* but also that his musical scholarship was profound and his genius many-sided. For his *Discursus Cantiones Sacræ,* published in conjunction with his pupil William Byrd, Elizabeth granted the two a patent of protection and for the exclusive right of printing music, etc., for 21 years.

TALLMADGE, *tăl'mĭj*, BENJAMIN: soldier of the Amer. revolution: 1754, Feb. 25—1835, Mar. 7; b. Setauket, L. I. He graduated at Yale Coll. 1773. At the beginning of the war, he enlisted; was promoted to major; and had custody of Maj. André during the latter's imprisonment. He participated in important battles in Penn. To him was due the inception and execution of a successful plan to capture a body of 500 tories on L. I.; also to take Ft. George on the n. shore of L. I., at Oyster Bay, and destroy the enemy's stores. Raised to a colonelcy before the end of the war, he afterward became a merchant at Litchfield, Conn., where he died. For 16 years from 1801 he served in congress.—His son FREDERICK AUGUSTUS T., 1792–1869, Sep. 17; graduated at Yale 1811, and at the Litchfield Law School; practiced law in New York; was captain of cavalry in the war of 1812; state senator 1837–40, and presided; recorder of New York 1841–46 and 1848–51; and was credited with official decision in dealing with the Astor Place riot raised by the friends of the tragedian Forrest against the rival Macready. He filled other offices, and was in congress 1847–49. He died in Litchfield.

TALL'MADGE, JAMES, LL.D.: statesman: 1778, Jan. 28—1853, Sep. 29; b. in Dutchess co., N. Y. He graduated at Brown Univ.; practiced law in New York; and was in congress 1817–19, taking an active part on the side of freedom in the exciting debates on admitting Mo. as a free state, and making a notable speech on the subject 1819, Feb. He was prominent in the state constitutional conventions 1821 and 46, in the legislature 1825, and as lieut.-gov. 1826–28. For nearly 20 years he was pres. of the Amer. Institute, and collected much material for it, especially in Russia, where he introduced cotton machinery. In the war of 1812, he was commissioned brig. gen., but commanded only home-guards in New York, the city of his residence and death. Among his eloquent public addresses were those at the reception, and on the death, of Lafayette.

[See also, TALMAGE.]

TALLOW, n. *tăl'lō* [Ger. *talg;* Dut. *talk;* Icel. *tolgr*, the solid fat of ruminants: Ger. *talgen*, to daub]: the fat of ruminant animals, separated from the membranes by melting down (see OILS—including the Fats): V. to smear or grease with tallow; to fatten. TAL'LOWING, imp. TAL'LOWED, pp. *-lōd:* ADJ. greased with tallow. TAL'LOWER, n. *-ĕr*, one who deals in tallow; an animal which fattens readily. TAL'LOWY, a. *-lō-ĭ*, or TAL'LOWISH, a. *-lō-ĭsh*, like tallow; greasy. TALLOW-CHANDLER, one who makes and sells candles. TALLOW-CHANDLERY, the shop or occupation of a tallow-chandler. TALLOW-FACED, having a pale sickly complexion. MINERAL-TALLOW, one of the mineral resins, a light, soft, fatty substance of a greenish-yellow color; also called *hatchetine* (see MINERAL-TALLOW). VEGETABLE TALLOW, a kind of fat-like tallow obtained from various plants.

TAL'LOW TREE: name given in different parts of the world to trees of various kinds which produce a thick oil or vegetable tallow, or a somewhat resinous substance which, like tallow, is capable of being used for making candles. The T. T. of Malabar (*Vateria Indica*) is a very large tree of nat. order *Dipterocarpaceæ:* it has leathery leaves 4–10 ft. long, and panicles of white, fragrant flowers, with five petals. The stem is often 16 ft. in circumference. By incisions in the stem, E. Indian copal is got; and by boiling its seeds, there is obtained a firm, white, vegetable tallow, which, as it has no unpleasant smell, is particularly suitable for making candles and soap.—The T. T. of China (*Sapium sebiferum*, or *Stillingia sebifera*) belongs to the nat. order *Euphorbiaceæ:* the capsules are internally divided into three cells, each containing a nearly hemispherical seed covered with a beautifully white vegetable tallow. This the Chinese collect for manufacture of candles, in order to which the capsules and seeds are crushed and boiled, and the fat skimmed off while melted. To give it firmer consistency, wax is added in the proportion of three parts to ten of the vegetable tallow; linseed-oil also is added. The candles made of it are beautifully white. This tree has been introduced into India, W[illegible] dies, and the s. states of the American Union. It is [illegible]tivated about Charleston and Savannah, and is almost naturalized in maritime parts of N. and S. Carolina. It presents a beautiful and remarkable appearance at the approach of winter, when the leaves become bright red, and the pericarps falling off, leave the white seeds suspended by threads. The wood is very hard and is much used for printing-blocks.—The name T. T. is sometimes given in N. America to a species of CANDLEBERRY (q.v.).—The T. T., or BUTTER AND TALLOW TREE of Sierra Leone is *Pentadesma butyracea*, of nat. order *Guttiferæ*, whose fruit furnishes a solid oil.

TAL'LY: one of the notched sticks which, so late as the reign of George III., were used in England for keeping accounts in exchequer, answering the double purpose of receipts and public records. They were well-seasoned rods of hazel or willow, inscribed on one side with notches indicating the sum for which the tally was an acknowledgment, and on two opposite sides with the same sum in Roman characters, with the name of the payer and the date of the transaction. Different kinds of notches, differing in breadth, stood for a penny, a shilling, a pound, £20, £100, and £1,000. The tally was cleft through the middle by the deputy-chamberlain with knife and mallet, so that each piece contained one of the written sides and a half of every notch; and the one half was retained by the payer as his receipt, while the other was preserved in exchequer. The destruction of the houses of parliament by fire 1834 is attributed to overheating of the flues in which the discarded tallies were being burned.

TALLY, n. *tăl'lĭ*, plu. TAL'LIES, *-lĭz* [F. *tailler;* It. *tagliare*, to cut: F. *taille*, a tally (see TAILOR)]: stick on which notches or scores were cut corresponding to the notches cut on another stick—formerly used as a method of keeping and checking accounts (see below): anything made to suit or correspond to another; a label or ticket of wood or metal: V. to make to correspond; to correspond; to fit; to match; to suit; to keep tally. TAL'LYING, imp. TAL'LIED, pp. *-lĭd*, agreed; fitted; suited. TAL'LIER, n. *-lĭ-ĕr*, one who keeps tallies to check accounts—now spelled TELLER, which see. TAL'LYMAN, one who sells for weekly payments, or payments for other short periods. TALLY-SHOP, a shop where goods can be obtained to be paid for by weekly or monthly payments.

TALLY-HO, int. and n. *tăl'lĭ-hō'* [corrupted from F. *taillis au!* to the coppice!]: the huntsman's cry to his hounds; a pleasure coach.

TALLY SYSTEM: mode of buying goods in vogue in England among the wives of poor men, whereby they get goods, chiefly articles of dress and cheap finery, on credit or on terms of payment by small weekly sums till the debt is paid.—The same mode under a different name, and not restricted to purchases by women, is practiced to some extent in this country.

TALMA, n. *tăl'ma* [prob. after *Talma*, the French tragedian]: a kind of large cape or short full cloak, worn by ladies, and sometimes by gentlemen.

TALMA, *tăl'ma*, F. *tăl-mâ'*, JOSEPH FRANCIS: eminent French tragedian: 1763, Jan. 15—1826, Oct. 19; b. Paris. He made his *début* as an actor 1787, at the Comédie Française, where he played the part of Séide in *Mahom.* He achieved considerable success, but excited no very high anticipations of his future career; and for more than a year he figured only in secondary characters. He gained public attention first by an innovation in costume in the part of Proculus in the tragedy of *Brutus.* Previously, actors had worn the garb of their own country and their own time; and Roman senators stalked about the stage dressed as Parisian 'swells' of the 18th c. Discarding this absurdity, T. appeared in the green-room clothed in a Roman toga, to the astonishment of the company, one of whom (Louise Contat) exclaimed: 'Look at Talma; how ridiculous he is! *Why, he has quite the air of an ancient statue!*' T.'s first grand triumph in acting was won 1789, Nov. 4, when he played Charles IX. in Chenier's drama. During the Revolution, he was in the zenith of his popularity, and made peculiarly his own such characters as Abdelazis, in *Abdelazis et Zuléma;* Othello; Néron, in *Epicharis et Néron;* Pharax, in *Abufar;* and Egisthe, in *Agamemnon.* T. had perfect physical gifts for the highest tragedy, and a voice of singular beauty and power, with an admirable elocution. Exceedingly arrogant and choleric, he was often at strife, either with the public or with his fellow-actors. T. was a favorite with Napoleon and Louis XVIII. Some of his later characters were among his

best, as Marigny, in *Les Templiers;* Leicester, in *Marie Stuart;* Sylla; Oreste in the *Clytemnestre;* Leonidas; and Charles VI See his *Mémoires* (4 vols. 1850).

TALMAGE, JAMES EDWARD: American geologist: b. Hungerford, Berkshire, England, 1862, Sep. 21. In 1876 he emigrated to Utah with his parents, who embraced the faith of the Latter Day Saints. He was a student at Lehigh University 1882-3, and at Johns Hopkins University 1883-4, and was graduated in analytic chemistry from the former in 1891. He was president of the Latter Day Saints' College, Salt Lake City, 1888-93, and president of the University of Utah 1894-7, when he resigned the office but retained the chair of geology. He has published: *First Book of Nature* (1888); *Domestic Science* (1891); *The Articles of Faith; The Book of Mormons; The Great Salt Lake, Present and Past;* etc.

TALMAGE, THOMAS DE WITT: American Presbyterian clergyman: b. Bound Brook, N. J., 1832, Jan. 7; d. Washington, D. C., 1902, Apr. 12. He was graduated from the New Brunswick Theological Seminary in 1856 and was ordained pastor of the Reformed Dutch Church, Belleville, N. J., in that year. He held Reformed (Dutch) pastorates in Syracuse, N. Y., in 1859-62, and Philadelphia, in 1862-9; was a chaplain in the Union army during the Civil war, and in 1869 became pastor of the Central Presbyterian Church in Brooklyn, N. Y. His congregation erected in 1870 a new church known as the Brooklyn Tabernacle, which was burned in 1872. It was rebuilt in 1874, but twice again was destroyed by fire. After the third fire in 1894 Dr. Talmage resigned his pastorate and traveled abroad. In 1895 he accepted a call as associate pastor of the First Presbyterian Church of Washington, D. C., later becoming full pastor, a charge which he resigned in 1899 in order to devote himself to literary work. He was editor of *The Christian at Work,* New York, in 1873-6; of *The Advance,* Chicago, in 1877-8; of *Frank Leslie's Sunday Magazine,* in 1879-80; and of the *Christian Herald,* New York, from 1890. For 30 years his sermons were printed weekly in religious and secular papers, and in 1901 it was estimated that they were published in 3,600 newspapers in various languages. He also appeared weekly for many years as a lyceum lecturer. Among his many publications are: *The Almond Tree in Blossom* (1870); *The Brooklyn Tabernacle* (1884); *From the Pyramids to the Acropolis* (1892); *From Manger to Throne* (1894); etc. He was a speaker of unstinted expression and action, thoroughly orthodox and evangelical, with a vein of poetic originality and reputed extravagance, and he always drew and interested great audiences as a preacher and frequent lecturer. His lectures were richly spiced with anecdotes, and delivered with dramatic elocution and action. In denouncing current error and vice, he was outspoken.

TALMUD, n. *tăl'mŭd* [Aram. *talmûd*, instruction: Heb. *talmid*, a scholar—from *lâmad*, to learn]: body of fundamental Jewish laws, comprehending the laws of Moses, the expositions and amplifications of the rabbins thereon, and a collection of traditions: the book or books containing them (see below). TALMUDIC, a. *tăl-mŭd'ĭk*, or TALMUD'ICAL, a. *-ĭ-kăl*, pert. to or contained in the Talmud. TALMUDISTIC, a. *tăl mŭd-ĭs'tĭk*, pert. to the Talmud. TALMUDIST, n. *tăl'mŭd-ĭst*, one learned in the Talmud.—The *Talmud* is the fundamental code of the Jewish civil and canonical law, comprising the Mishna (q.v.) and the Gemara (q.v.), the former as the text, the latter as the commentary and complement. See HALACHA and HAGGADA, for the gradual development of this 'Oral' Post-Mosaic Code; also for mention of the older collections on which the Mishna was framed and finally redacted in the form in which we now possess it. The oldest codification of Halachoth, or single ordinances, is due to the school of Hillel (q.v.). Simon ben Gamaliel the Patriarch (A.D. 166) and his school carefully sifted the material thus brought together; and in the following generation, through Jehudah Hanassi (219 A.D.) and his disciples, the work was brought to its close in six portions (Sedarim), 63 treatises (Mesichtoth), and 524 chapters (Perakim), which contain the single Mishnas: for summary of its contents, see MISHNA. But besides this authoritatively compiled code, there were other law collections, partly anterior to it and not fully embodied in it, partly arising out of it—as supplements, complements, by-laws, etc.—partly portions of the ancient Midrash (q.v.), partly either private text-books, composed by the masters of the academies for their lectures, or enlargements of the existing Mishna. All this additional legal material was collected, often together with the dissensions which begot it, under the name *Boraitoth*, by Chia and his school, in the succeeding generation. Not to be confounded with these, however, are the collections of *Toseftas* or *Great Mishnas*, which, beginning at the time of Jehudah Hanassi himself, and continued after his death by Chija and Hoshaja, embody much of what has been purposely left out in the concise Mishna, which comprised only the final dicta and decisions. Such 'additions' we possess now to 52 of the treatises, forming together 383 Perakim or chapters. All these different sources of the 'Oral Law'—finally redacted before the end of the 3d c., though probably not committed to writing until 550—belong to the period from about B.C. 30 to about A.D. 250. This great mass of legal matter, though apparently calculated to provide for every case, if not for all times, was yet found insufficient: dicta of later masters, decisions of courts, discussions on the meaning and purport of special traditions, attempts at reconciling apparent contradictions in the received material, amplifications or modifications of certain injunctions rendered necessary by shifting wants and conditions of the commonwealth—all these and other circumstances made further codification peremptory.

This Mishna (Mathnisin), though it contained only in

digenous laws and institutions, was yet not a little influenced—if its very redaction was not indeed caused—by the spirit of the times. At Berytus, at Alexandria, at Rome, the legal schools were then in their most vigorous stage; and everywhere system and method were being introduced into the vast complex of traditional and popular institutions, decrees, and decisions. The Mishna fulfilled all reasonable requirements for such a text-book; it was clear, concise, complete, and systematic; and was in as classical a Hebrew as still could be written in those days of decadence of the 'sacred language.'

The further development of this Supplementary, Oral, or Second Law, in fact rather an exegesis thereof, together with the discussions raised by apparent contradictions found in the individual enactments of the Mishnic doctors, is called Gemara, i.e., discussion, complement, or, according to another explanation, doctrine. This Gemara contains, apart from the Halacha (q.v.) which is generally in Aramaic, also a vast number of non-legal, chiefly Hebrew, fragments--homiletic matter, tales, gnomes, legends, and the like--called Haggada (q.v.).

There are two Talmuds: one called the T. of the Occidentals, or the 'Jerusalem' (Palestine) T., which was closed at Tiberias; the other, the 'Babylonian' T. The first of these now extends over 39 treatises of the Mishna only, though it formerly existed to the whole of the first five *Sedarim* or portions. Its final redaction—falsely attributed to R. Jahanan (died 279)—belongs probably to the end of the 4th c. There is less discussion and more precision of expression in this than in the second or Babylonian T., emphatically styled 'our Talmud,' which was not completed until the end of the 5th c., and which makes use of the former. Rabbi Ashe, pres. of the academy of Syra in Babylon (365-427), is to be regarded as the real editor of the Babylonian T. Both the Mishna and the Palestine Gemara had, notwithstanding the brief period since their redaction, suffered greatly, partly by corruptions in their (unwritten) text through faulty traditions, partly through the new decisions arrived at independently in the younger schools—of which there flourished many in different parts of the Dispersion—and which were at times contradictory to earlier decisions. To end these disputes, whose confusion threatened to end in chaos R Ashe, aided by his disciple and friend Abina, or Rabina (abbr. from Rab Abina), commenced the cyclopean task of collecting anew the enormous mass of Halachistic material which by that time had grown up. His method was simple. His disciples met twice a year at Syra, in spring and in autumn. At the spring gathering, he gave out all the paragraphs of one treatise; and the disciples had the task to find out until the autumn meeting what opinions the different schools had pronounced on the special points thereof: he then investigated the whole critically, and put it into shape according to a certain order. This process occupied him, with assistance of ten secretaries, no less than 30 years; and another 30 years were spent by him in the

revision in the same manner. The final close of the work, however, is due, not as generally stated, to R. Jose, his successor at the acad. (died 475), but to the school of the Saburaim at the end of the 5th century.

The Babylonian T., as now extant, comprises the Gemara to almost the whole of the 2d, 3d, and 4th *Sedarim* (portions), further to the first treatise of the first, and to the first of the last order: the rest, if it ever existed, seems now lost. The whole work is about four times as large as the Jerusalem T., and its 36 treatises, with the commentaries generally added to them in our editions (Rashi and Tosafoth), fill 2,947 folio leaves. The language of the T is Aramaic (Western or Eastern), or 'Chaldee,' closely approaching to Syriac. The minor idiomatic differences between the two, are easily accounted for by the different time and place; but the additional matter—quotations and fragments from older Midrash and Gemara collections, Haggada, etc.—is, as above stated, principally in Hebrew.

The masters of the Mishna (Tanaim) and of the Gemara (Amoraim) were followed by the Saburaim (see above). The code of the Oral Law had come to a close with the Gemara; and not its development, but rather its proper study, elucidation, and carrying into practice, was the task of the generations of the learned that followed. Apart from this, the Aramaic language itself began to die out as the popular language, and required further study. The Saburaim no longer dared to contradict, but only gave opinion on the meaning and practicability of certain enactments, and undertook the task of inculcating and popularizing the teachings of their sires: apart from bestowing proper care on the purity of the text itself, and adding some indispensable glosses. Their activity was at its height in the 8th c., when Karaism (see JEWISH SECTS), which utterly denied the authority of the T., sprang into existence. Respecting, however, this authority of the T. itself, there has never been anything approaching to a canonicity of the code, or of a reception of it as a binding law-book by the whole Jewish nation. The great consideration in which it was always held is due, partly to its intrinsic value, and to the fact of its becoming the basis of all further development of Jewish literature (it being undeniably the most trustworthy receptacle of the traditional Jewish law); and partly to a prosecution against the Jews in the persian Empire at the time of Jesdegerd II., Firuz, and Kobad, who closed the schools and academies for nearly 80 years, during which this book was the sole authoritative guide of public conscience, and retained its importance even when the schools had been restored. The best commentaries of the Mishna are by Maimonides and Bartenora; of the Babylonian T. by Rashi (q.v.) and the *Tosafists* of France and Germany. An abstract of the T. for practical (legal) purposes by Maimonides (q.v.) is called Mishne Thorah. The Mishna was printed first at Naples 1492; the T. of Jerusalem at Venice about 1523. The Babylonian T. was published first at Venice 1520: it is printed generally in 12 folios, the text on the single

pages being kept uniform with the previous editions to facilitate the references. No translation of the Gemara has ever been carried further than a few single treatises. The complete Mishna, on the other hand, has been translated repeatedly into Latin, German, Spanish, etc., by Surenhus, Rabe, Jost, and others.

The Talmud is a work completely *sui generis*. It will assuredly, when properly investigated, prove one of the most important records of humanity. No statement that can here be made can give even an approximate idea of the immensity of material, historical, geographical, philological, poetical, that lies hidden in its mounds. A contribution to the records of fanaticism also may be found in the 'exoteric' history of the Talmud, which was —though utterly unknown except by a few garbled extracts—prohibited, confiscated, burned, and generally prosecuted and inveighed against by emperors, popes, theologians, and fanatics generally, from Justinian down almost to the present day. In our own times its value begins to be recognized by scholars, not merely as the source for knowledge of Judaism, but as the chief source —next to the gospels—even for the history of the origin and early days of Christianity; a notion long ago hinted at by eminent divines like Lightfoot and others. See JEWS; MIDRASH; MISHNA; HALACHA; HAGGADA; and an essay in the *Literary Remains* of Em. Deutsch. The best general introduction is by Hielziner, New York, 1903.

TALON, n. *tăl'ŏn* [F. *talon*—from L. *tālus*, the heel: It. *tallone*, the heel]: the claw of a bird of prey; in *arch.*, the ogee molding.

TALON, JEAN BAPTISTE: French Canadian administrator: b. Picardy, France, 1625; d. 1691. In 1663 he was made chief officer of justice, police and finance in the French possessions in America. He encouraged trade by building ships and sending exploring parties to Hudson Bay and the upper lakes. Three of his seigniories were erected into baronies and he assumed the title of Count d'Orsainville. His memoirs form a valuable source of information with regard to early Canadian history.

TALOOK, n., or TALUK, n. *tă-lôk'*: in the *E. I.*, a district or dependency, the revenues of which are administered by a talookdar. TALOOK'DAR, n. *-dâr*, in the *E. I.*, the native head of a department acting under a superior.

TALPA, n. *tăl'pă*, plu. TAL'PÆ, *-pē* [L. *talpa*, a mole]: the common mole; in *surg.*, a tumor under the skin; an encysted tumor on the head. TAL'PIDÆ, n. plu. *-pĭ-dē*, the family of moles. See MOLE.

TALUS, n. *tā'lŭs* [L. *tālus*, the ankle]: in *anat.*, the ankle-bone; a kind of club-foot—*talipes calcaneus;* in *arch.* or *fort.*, the slope of a wall which diminishes in thickness as it rises; in *geol.*, a sloping heap of fragments at the bottom of a rocky declivity, and which accumulates from its weathered and wasted surface.

TALTAL, *tâl-tâl'*, Chile; a seaport in the province of Antofagasta, situated near the southern boundary of the province. It has railroad connection with the mining regions of the interior, and exports considerable quantities of mining products, including gold. Pop. (1895) 6,862.

TÁLUK, *ta-lôk'*, or TAALLUGAH: a term applied to land tenure in India, and having different meanings in different parts of the country, but generally describing an estate subject to some control intermediate between the government and the proprietor. The word itself in Arabic signifies dependence, and this indicates the usual sense of the term as applied to land. In Bengal it is an ownership subordinate to the Zemindars, who were originally tax-farmers for native princes, but whom the British authorities in India elevated to a sort of lordship over the property whose taxes they gathered in. In the northwestern provinces it is an inferior estate, or part of an estate, paying revenue through a superior proprietor. In Oude the term is applied to great landholders, perhaps as dependent on and inferior to the sovereign, Oude having formerly been an independent kingdom. In Madras the word means a district set off for revenue purposes, evidently a derivation from the old meaning of an estate held under tax-farmers.

TAM-SUI, *tâm-sô'ē*, Formosa: a seaport on the n.w. coast of the island at the mouth of the Tam-sui river, 10 m. below Tai-pei, the capital. It is the chief export town of the island, and the principal staple is tea, also rice, sugar, camphor, etc.

TAMA, Iowa: city in Tama co.; on the Iowa river, and on the Chicago, Milwaukee and St. Paul and the Chicago and Northwestern railroads; about 63 m. n.e. of Des Moines and 18 m. e. by s. of Marshalltown. It is in an agricultural and stock-raising region. An Indian reservation (Sac and Fox) is nearby. The chief manufacturing establishments are flour mills, paper and lumber mills, broom factories, machine shops, and cigar factories. Egg-cases, shipping boxes, and wagons are among the manufactures. The shipments consist chiefly of flour, brooms, poultry, live-stock, eggs, vegetables, and grain. There are seven churches, public and parish schools, and a library. There are two banks, one private, and one, a national bank, with a capital of $50,000. Pop. (1900) 2,649.

TAMAN'DUA. See ANT-EATER.

TAM'ANOIR: the great ant-eater.

TAMAQUA, *ta-mâ'kwa*, Pa.: borough in Schuylkill co.; on the Little Schuylkill river, and on the Philadelphia and Reading and the Central of New Jersey railroads; about 38 m. n. of Reading and 18 m. n.w. of Pottsville. It is in a region noted for the quantity and quality of coal deposits. The chief manufacturing estab-

lishments are flour mills, foundries, machine shops, powder-mill, and planing mills. It has large coal yards. The government census of 1900 gives the number of manufactories 64; amount of capital invested, $917,124; number of wage-earners in manufactories, 564; annual wages, $229,728; cost of material, $388,937; annual value of products, $847,964. There are 12 churches, a high school, elementary schools, a business college and a library. There are two banks; a state bank with a capital of $50,000, and a national bank with a capital of $100,000. Pop. (1900) 7,267; (1910) 9,462.

TAMAR: (1) a southern river of England, flowing between the counties of Cornwall and Devonshire; and emptying through the Hamoaze into Plymouth Sound, 2 m. above Plymouth; length about 60 m. (2) a river of Tasmania, formed by the union of the North and South Esk, and flowing into Bass' Straits at Fort Dalrymple.

TAMARACK, *tăm'a-răk:* name in the middle, southern, and western states for the Larch (q.v.).

TAMARA SPICE, *tăm'a-râ:* favorite mixture of condiments used by the Italians; consisting of powdered cinnamon, cloves, and coriander seeds in equal parts, and half the same quantity of aniseed and fennel-seed powdered.

TAMARIN, n. *tăm'ă-rĭn* (*Midas*): genus of South American monkeys, small and beautiful, with short muzzle, prominent forehead, long nails, which, except on the hinder thumbs, are formed like claws, the tail longer than the body, not prehensile, and covered with hair so as to resemble the tail of a squirrel. The SILKY TAMARIN, or MARAKINA (*M. rosalia*), is the best known: it is of golden yellow color, with fine silky hair, of which it is exceedingly careful, to keep it free from stain. It is often taken to other countries, but is very tender, and seldom lives long. It is very gentle and playful. The hair of the head and neck is elongated, so as to form a wig or mane; but this character appears far more strongly in the LITTLE LION MONKEY (*M. leonina*), which inhabits the e. slope of the Cordilleras, and whose appearance—though it is a very small animal, not many inches long—is an amusing caricature of that of the lion.

TAMARIND, n. *tăm'ă-rĭnd* [Ar. *tamr'ul Hind. lit.*, the date of India—from *tamr*, a dried date—so named as having originally come from the country of the dates], (*Tamarindus Indica*): beautiful tree, of nat. order *Leguminosæ*, sub-order *Cæsalpineæ*, native of the East Indies, but now generally cultivated in warm climates. Only one species is known (*T. Indica*), a spreading tree, 30 or 40 ft. high, with alternate pinnate leaves, which have 12 to 15 pairs of small leaflets, and fragrant flowers, with three petals, the pods brown and many-seeded, as thick as a man's finger, and about 6 inches long. The pods are filled with a pleasant, acidulous, sweet, reddish-

black pulp. It is brought to America and Europe, mixed with seeds and fibres in a mass resembling jam, from the East and West Indies, and the Levant. Tamarinds are preserved usually by pouring hot syrup on the ripe pulp; but a better method is to put alternate layers of tamarinds and sugar in a stone jar, the color and taste being thus more like those of the fresh pulp. The wood of the tamarind tree, and especially of its roots, is a cabinet wood of much beauty, but so hard that it is wrought with difficulty.—The pods of some other trees of genera allied to *Tamarindus* are filled with a similar pulp, used in the same way; e.g., the tamarind plum of India (*Dialium Indicum*), and the brown and velvet tamarinds of Sierra Leone, species of *Codarium*.

On chemical analysis, tamarind pulp is found to contain citric, tartaric, and malic acids, potash, sugar, vegetable jelly, etc. As a salt of copper is a common adulteration, a piece of polished iron (a knife, e.g.) may be plunged into the pulp and left in it for an hour, when, if copper be present, it will be deposited on the iron. Tamarind pulp is refrigerant and gently laxative; and in combination with more active remedies, is often employed in diseases of children. It is used in India as a cooling article of food; and a kind of sherbet is formed from it; it is also an excellent addition to curries. Tamarind tea is made by infusing tamarinds in boiling water; when cool, it is an agreeable cooling drink in inflammatory or febrile disorders. Tamarind whey is prepared by boiling one ounce of tamarinds with a pint of new milk, and straining: this also is an excellent cooling drink in cases similar to the above.

TAMARISK, n. *tăm'ă-rĭsk* [F. *tamarisc* and *tamaris* —from L. *tamaris'cus, tamarx*, a tamarisk], (*Tamarix*): genus of plants of nat. order *Tamariscinæ*, sometimes called flowering cypress. This order contains more than 20 (reduced from 60) known species, all natives of warmer parts of Europe and Asia, and of Africa; growing generally in arid situations. Some are herbaceous; others are shrubs or small trees, with rod-like branches, scale-like leaves, and small flowers in close spikes or racemes. The calyx has four or five segments; the corolla four or five petals; the stamens are hypogynous, equal in number to the petals, or twice as many; the pistil has three or four styles; the fruit is a one-celled capsule, with numerous hairy seeds. The COMMON TAMARISK (*T. Gallica*) grows in sandy places in countries near the Mediterranean and in s. Asia, and has been naturalized in some places on the s. coasts of England: it sometimes attains a height of 30 ft. The twigs seem to possess tonic properties, and their medicinal virtues were formerly in high repute. The ashes of this and some other species of the genus contain much sulphate of soda. A variety yields what is termed Jews' or Tamarisk manna, or Mt. Sinai manna. See MANNA.—The ORIENTAL TAMARISK (*T. orientalis*, or *articulata*) grows from w.

India and westward; it is one of the few trees seen in the Arabian and African deserts, with whose sands it seems to struggle more than any other tree or shrub. Its leafless appearance accords with the surrounding desolation. It is called *atlé* or *ethel*, and its wood is used for fuel and for many economical purposes.—Galls are found on some species in India, chiefly the Oriental tamarisk, which yields 50 per cent of tannin, and are valued for medicinal use and for dyeing.—The GERMAN TAMARISK (*Myricaria Germanica*) is an allied plant, yielding a resin; it is a smaller shrub than the COMMON TAMARISK, and abounds in many parts of Europe and Asia. It was formerly supposed to possess valuable medicinal properties, but these are now little regarded.

TAMAULIPAS, *tâ-mow-lē'pâs*, Mexico: a state on the Gulf coast, occupying the n.e. corner of the country. Its area is about 32,000 sq.m. The s.w. part of the state is traversed by the Eastern Sierra Madre, but the greater portion belongs to the tertiary coastal plain, and is a rolling country, sloping gradually to the coast. The latter is lined with lagoons and sand-bars. The state is traversed by several large streams, and the Rio Grande forms the northern boundary. The climate on the coast is hot, and the northeastern plains are semi-arid. The population is chiefly centred on the lower mountain slopes, where the rain is sufficient. Agriculture and grazing are the chief industries. Cotton, sugar and cattle products are exported. The capital is Ciudad Victoria. Pop. of the state (1900) 210,948.

TAMBERLIK, ENRICO: Italian operatic singer: b. in Rome, Italy, 1820, Mar. 16; d. Paris 1889, Mar. 15. He began his career at Naples as tenor singer in 1841, and in 1850 went to England, where he enjoyed great popularity for 24 years. He visited the United States in 1857. After his retirement from the stage he lived in Madrid, where he engaged in the manufacture of small arms.

TAMBO'BONG, *tâm-bō'bŏng*, Philippines: pueblo, province of Rizal; in the n.w. part of the province, near the coast of Manila Bay; 5 m. n. of Manila. It has a large sugar refinery and a cigar factory; the weaving of cotton cloth and the fisheries are also important industries. It is connected with Manila by steam tramway, and carries on a considerable trade. Pop. 25,000.

TAMBOUR, n. *tăm'bĕr* [see TABOUR: F. *tambour;* It. *tamburo*, a drum: Ar. *tabl*, a drum]: small drum: in *arch.*, the naked part of certain capitals, bearing some resemblance to a drum; the wall of a circular temple surrounded with columns, or the circular vertical part of a cupola above and below; a round course of stones in a pillar: in *mil.*, inclosure of stockade work, usually of timber, about 6 ft. high, and loop-holed—for defense of a gateway or road. Tambour denotes also a frame used by embroiderers, so called from its original drum-like

shape; also the rich embroidery work on it: V. to embroider with a tambour. TAM'BOURING, imp. TAM'BOURED, pp. *-bĕrd.* TAM'BOURINE', n. *-bĕr-ēn'*, a kind of drum; a very ancient musical instrument, much used by the Biscayan and Italian peasants at their festivities, and sometimes introduced into orchestral music where the subject of the piece is connected with a people who use it, as the Basques, gypsies, or peasants of the Abruzzi. It consists of a piece of parchment stretched over the top of a broad hoop, which is furnished with little bells. It is sounded by sliding the fingers along the parchment, or by striking it with the back of the hand or with the fist or elbow.

TAM'BOURA: the name applied in Persia and Turkey to a musical instrument of the guitar species, with strings of wire struck with a plectrum. The neck is long, and the body, of gourd-shape, is often beautifully ornamented.

TAMBOUR-WORK: a species of embroidery introduced into Great Britain in the 18th century. A single tambour worker usually sits at a low circular frame, over the top of which the silk, linen, or muslin is stretched by means of a hoop, much in the same way as the head of a drum is tightened. A frame of different construction is used when several workers are employed on the same fabric, consisting principally of two rollers, which, when properly fixed, stretch the linen, etc., to the necessary degree of tension. As the work proceeds the finished part is wound over one roller, whilst a fresh surface is at the same time unwound from the other. The needle, which is about ½ in. in length, terminates in a small hook with the point curving inward. This is fixed in a handle of bone, ivory, or wood, of the thickness of a quill, by means of a small screw on the side. The worker, holding the thread on the under side of the frame, passes the needle through the muslin, etc., from the upper side, and by a continued series of loops interwoven together, succeeds in producing a very minute and beautiful chain line, with which she traverses the outline of any pattern previously sketched upon the fabric she is employed to ornament. The practice of tambouring is being replaced by pattern-weaving.

TAMBOV, *tăm-bŏv'*: government in s.e. Great Russia, bounded e. by the governments of Penza and Saratov; 25,710 sq.m. The s. districts are hilly; the interior is a somewhat elevated plateau, with gradual slope toward the n. Several lakes are in the n.; and the principal streams are the Tsna, affluent of the Moksha, and the Moksha, itself an affluent of the Oka. The climate, from the exposure to the biting north winds, is colder in winter than in neighboring governments. The soil in the central and s. districts is a rich vegetable mold, and very productive. In the n. clay predominates, requiring much manure. The chief agricultural products are rye, wheat, buckwheat, oats, hemp, and flax. The larger

forests are in the n., and pasture-lands extend mostly along the banks of the rivers. Agriculture and cattle-breeding are principal employments; and some of the breeds of oxen, sheep, and horses are excellent. Cloth, distilled liquors, tallow, and iron are chief manufactures. The products are exported largely by the Tsna and the Moksha to the Oka and Volga. Non-conformity has spread considerably among the people. Pop. 2,715,-453.

TAMBOV': city, capital of the government of Tambov; on the Tsna, 750 m. s.e. of St. Petersburg, 300 m. from Moscow. It was founded 1636 under Czar Michael Theodorovich, and served as a fortress against Tartar invasion. It is regularly built; and, though the houses are mostly of wood, there are several important institutions, as the college, military hospital, etc. Tambov is the seat of considerable manufacture of cloth and sail cloth. The chief articles of trade are leather, wool, tallow, and salt beef. Pop. 48,134.

TAMBURINI, *tâm-bô-rē'nē*, ANTONIO: 1800, Mar. 28 —1876, Nov. 9; b. Faenza, Italy: opera-singer. His voice was a baritone of much sweetness. He sang for several years in the theatre and churches of his native city; made his *début* in opera at Bologna 1818, and at London and Paris 1832; and was an original performer in Bellini's *Puritani*. Tamburini was most popular in *Figaro* and *Don Giovanni*. He retired 1854.

TAME, v. *tām* [Dut. *tam;* Ger. *zahm*, tame: Icel. *tamr*, accustomed to: Gr. *damaein:* L. *domārĕ*, to subdue]: to reduce from a wild to a domestic state; to civilize; to subdue; to reclaim: ADJ. that has lost its native wildness; domestic; mild; gentle; subdued; spiritless; servile; wanting in vigor; dull. TA'MING, imp. TAMED, pp. *tāmd*. TA'MER, n. *-mĕr*, one who tames. TA'-MABLE, a. *-mă-bl*, capable of being reclaimed from a wild or savage state. TA'MABLENESS, n. *-bl-nĕs*, the quality of being tamable. TAMENESS, n. *tām'nĕs*, the quality of being tame or gentle; want of spirit; the being without interest or beauty, as a scene. TAME'LESS, a. *-lĕs*, wild; untamable. TAME'LY, ad. *-lĭ*, in a tame manner; meanly; servilely; unresistingly.

TAME ANIMALS, in Law: animals reclaimed from the wild or savage state, and whose owners may be held subject to certain legal liabilities. In these animals there is absolute right of property. If a tame animal is known to be mischievous, its owner who suffers it to be at large is responsible for damage done by the animal. A ferocious domestic animal may be killed with impunity by any one. The owner of such an animal may be indicted for common nuisance. But unless the keeper or owner knows of the existence of a tendency to ferocity in the animal, he is not liable for damages.

TAMERLANE'. See TIMÛR.

TAM'IAS. See GROUND-SQUIRREL.

TAMIL, *tâ-mēl'* (properly *Tamir'*, erroneously *Tamul*; the language and country being erroneously termed by earlier Europeans 'the Malabar'): people, and their country and language, in s. India and n. Ceylon.—The T. language was the earliest cultivated of all the idioms which Bp. Caldwell designates as Dravidian—this term comprising according to him, besides the Tamil, the Telugu; Canarese; Malayâlam, or Malayârma; Tul'u, or Tul'uva; Toda, or Tuda, or Tudava; Kôta, Gônd; and Khond, or Kund, or Ku. The *T. language*, this learned author says in *Comparative Grammar of the Dravidian or South-Indian Family of Languages* (2d ed. London 1875), is spoken throughout the vast plain of the Carnatic, or country below the Ghauts, from Pulicat to Cape Comorin, and from the Ghauts, or central mountain-range of s. India, to the Bay of Bengal. It is spoken also in the s. part of the Travancore country, on the w. side of the Ghauts, from Cape Comorin to the neighborhood of Trivandrum; and in the n. and n.w. parts of Ceylon, where Tamil'ians formed settlements prior to the Christian era, and whence they have gradually thrust out the Singhalese. Throughout Ceylon, the coolies in the coffee plantations are Tamil'ians; the majority of the money-making classes even in Colombo are Tamil'ians; and ere long, the Tamil'ians will have excluded the Singhalese from almost every office of profit and trust in their own island. The majority of the domestic servants of Europeans, and of the camp-followers in every part of the presidency of Madras being T. people, T. is the prevailing language in all military cantonments in s. India, whatever the vernacular language of the district; hence, at Cananore, in the Malayâla country; at Bangalore, in the Canarese country; at Bellary, in the Telugu country; and at Secunderabad, where Hindustani may be considered the vernacular, the language which most frequently meets the ear in the bazaar is the Tamil'. The majority of the *Klings*, or Hindus, found in Pegu, Penang, Singapore, and other places in the further east, are Tamil'ians. . . . Including Tamil'ians resident in military stations and distinct colonies, and the Tamil'ian inhabitants of s. Travancore and n. Ceylon . . . the people who speak the T. language may be estimated at *about ten millions*. Bp. Caldwell says further: 'T. includes two dialects, the classical and the colloquial,' or the ancient and the modern; called respectively the Shen-T. and the Kod'un-T.' (*Comparative Grammar, etc.*) The classical or ancient is the language of poetry and of the ancient inscriptions; it contains fewer words borrowed from the Sanskrit than the colloquial T., and among these chiefly such as express abstract ideas of philosophy, science, religion, and technical terms of the more elegant arts; and in general, it so considerably differs from the colloquial T. that it is almost unintelligible to the unlearned Tamil'ian. Of all the Indian languages T. has the most imperfect alphabet. The latter consists of 12 vowels—viz., *a*, *â*, *i*, *î*, *u*, *û*, *e*, *ê*, *o*, *ô*, *âi*, and *aû*—and of 18 consonants—viz., *k*, *ch*, *t'*, *t*, *p*, *R*, *ng*, *ñ*, *n'*, *n*, *m*, a final *n*, *y*, *r*, *l*, *v*, *r'*,

l'. Compared to the Devanâgarî alphabet of Sanskrit, it is deficient therefore in the vowels *r'i*, *r'î*, and *lr'i*, though it possesses a short *e* and a short *o*, which the Devanâgarî has not; it has but one sound for *k*, *kh*, *g*, *gh;* for *ch*, *chh*, *j*, *jh;* for *t'*, *t'h*, *'d*, *'dh;* for *t*, *th*, *d*, *dh;* and for *p*, *ph*, *b*, *bh*. It lacks, moreover, the Sanskrit aspirate *h*, the Sanskrit sibilants, *s*, *s'*, and *sh*, and Annswa'ra and Visarga. Of combined consonants, which abound in the Devanâgarî alphabet, it admits only the junction of the nasal and the mute, as *n-t*, *n'-t'*, etc.; doubled nasals, as *n-n*, *m-m*, etc.; doubled surds, as *k-k*, *ch-ch*, etc.; also *t'k*, *t'p*, *Rk*, *Rch*, *Rp*, *yy*, *ll*, *vv*, and *nR;* of triple consonants, only *r'nd* and *ynd*. If Sanskrit derivatives, therefore, are Tamil'ized, various devices are used to separate Sanskrit groups of consonants: thus, Sanskrit *pra* becomes T. *pira;* Sanskrit *kr'ishn'a* becomes T. *kirut't'ina-n* or *kit't'ina-n* (*t't'* instead of *sh*).

The history of the T. country and its people is, in its earliest periods, involved in obscurity. From evidence afforded by the language, Dr. Caldwell has drawn a sketch tending to show that the un-Aryanized Tamil'ians had 'kings,' who dwelt in 'fortified houses,' and ruled small 'districts of country;' that they had 'minstrels,' who recited songs at festivals; but that they were without 'hereditary priests,' without 'idols,' and without ideas of 'heaven, hell, soul, or sin;' yet that they acknowledged the existence of God, whom they styled *kô*, or king, and erected to his honor a temple which they called *kô-il*, or God's house. Their chief worship, however, seems to have consisted in bloody sacrifices to the 'devil.' Dr. Caldwell further shows that they were acquainted with the ordinary metals, except tin and zinc, and with the planets known to the ancients, except Mercury and Saturn; that they had medicines, hamlets, towns, ships; and practiced some lower arts, such as cotton-weaving and dyeing, though none of the arts of the higher class, as painting, sculpture, etc.; that they knew no astronomy, and were ignorant of philosophy and grammar. The earliest civilization of the Tamil'ians is traditionally attributed to the influence of successive colonies of Brahmans from Upper India; and the leader of the first colony is said to have been the Rishi (q.v.) or saint *Agastya*, a personage who plays an important part in Brahmanical legends. He is called the first king of the Pândîya kingdom, which was near the s. extremity of the peninsula; and by the majority of orthodox Hindus he is believed to be still alive, though invisible to ordinary eyes. His era is supposed to belong to B.C. 6th c.; though, like all other ancient Hindu dates, this is uncertain. Whether the Vedic worship (see VEDA) was ever known in the T. country, is in doubt; the worship introduced by the Brahmans seems, on the contrary, to have been that based on the incarnation of Vishn'u (q.v.) and S'iva (q.v.), and therefore to belong to an advanced stage of Hinduism. Vaishn'avas, S'a'vas, and S'âktas (see these titles: also India) are the now prevalent sects in the T. country; for the Jainas (q.v.), who flourished in the Pândîya kingdom, probably

from the 8th or 9th. c. to the 12th or 13th after Christ, were finally expelled from it; and only a few adherents of this sect now are found there.

The oldest T. works are, however, those written, or claimed to have been written, by the Jainas; and it is remarkable that at any period of T. literature few Brahmans have contributed to it anything worth preservation. The finest composition which T. possesses is the *KuRal'* of Tiruval'l uvar, 'a work consisting of 1,330 distichs or poetical aphorisms, on almost every subject connected with morals and political economy': Dr. Caldwell holds that it is not later than the 9th c. after Christ. A commentary on this work by Parimelar'agar is the most classical production in T. by a Brahman. Besides the *KuRal'* the following works are said to have received the sanction of the Madura College, which was then probably the most celebrated seat of learning in all Hindustan. Their names are: *Naladiyar, Nanmanikkadikai, Iniyavai Narppatu, Inna Narppatu, Kar Narppatu, Kallavali Narppatu, Tokai. Tirikadukam, Asara Kovai, Pala Moli, Siru Pansa Mulam, Mutu Moli Kanji,* and *Elati.* For a list of other and later T. works, mediæval or modern, embracing the topics of Religion—Prot. theology, Rom. Cath. theology, Hinduism, and books published by Mohammedans—Jurisprudence, Philosophy, Science, Arts, Literature, Philology, Geography and History, Periodicals and Newspapers, see the useful *Classified Catalogue of Tamil'-printed Books with Introductory Notices,* John Murdoch (Madras 1865); and for learned purposes, Bp. Caldwell's invaluable *Comparative Grammar* noted above.

TAMINE, n. *tăm'ĭn,* or TAM'INY, n. *-ĭ-nĭ* [F. *étamine,* bolting-cloth—from L. *stamen,* the fixed threads in a loom]: a thin woolen stuff highly glazed; a strainer or bolter of hair or worsted cloth.

TAM'MANY SOCIETY, THE, or COLUMBIAN ORDER organization named after a Delaware Indian chief and established in New York 1789, May 12, 'to connect in indissoluble bonds of friendship American brethren of known attachment to the political rights of human nature and the liberties of the country.' Its constitution pledged it to the work of conciliating the savage tribes of Indians who were disputing with tomahawk and torch foot by foot the advancing steps of pioneer and settler; and, to express abhorrence of foreign manners and institutions, the soc. adopted Indian terms and customs for its ritual and ceremonies. Its founders had the further object in establishing it of attempting to counteract the effects of what they considered the anti-republican principles of the Society of the Cincinnati. But the latter soc. has held to its original principles and purposes to the present time: while the T. S. has become recognized on every hand as one of the most powerful political machines in the country. Its thorough organization insures to it the control of the democratic party in New York. The headquarters of the T. S. are in Tammany Hall, 14th street adjoining the Acad. of Music.

TAMMERFORS, *tăm'mĕr fors':* town in s. Finland, 250 m. (direct line) w.n.w. of St. Petersburg. It is on a rapid which connects two lakes and affords motive power to an extensive cotton-mill employing a large number of hands. There is also a large flax-mill, a fine stocking manufactory, and a paper-mill. Pop. (1883) 15,023.

TAMMUZ, *tăm'ŭz*, or THAMMUZ: word occurring once in the Bible—Ezek. viii. 14: 'And, behold, there sat women weeping for Tammuz;' and which seems to have been first an appellative, 'The Tammuz,' and afterward a proper name. Its derivation is as problematic as its meaning. The Vulgate (all the other versions give the word unchanged—thereby confessing the universal ignorance on the subject) has Adonis; and this has been largely accepted as the most credible explanation of this strange name; though the connection between the legends of T. and of Adonis relates really to only one point. If the two legends pertain to the same subject, T. probably means the Phœnician god Adonis (q.v.), whose chief temple and worship was at Byblus, but who at an early period had been introduced into Syria, Cyprus, and Greece, where he was connected with Aphrodite (q.v.). His festivals were expressions partly of joy, partly of mourning. In the latter, the women gave themselves up to a wild and furious grief over the 'lost Adonis,' shaved off their hair, and sacrificed their chastity in his temples. The days of mourning were completed by a solemn burial of an image of the god. This period was followed by a succession of festive and joyful days, in honor of the resurrection of Adonis. The river Adonis (Nahr Ibrahim) (see PHŒNICIA), which once a year 'ran purple to the sea' from the Lebanon, was supposed to be tinged by the blood of the god; and a vessel sent off from Alexandria, and carried by the tide to Byblus (see BYBLOS in Phœnicia), used to inform the mourners by letter that he had been found again. There is no doubt that the different phases of the year, or rather the disappearance and reappearance of the enlivening rays of the sun, and their influence upon all nature (see OSIRIS), were symbolized in these originally poetical, afterward most licentious and fanatical rites. The time of the year at which these feasts were celebrated has been much disputed: probably they took place at the summer solstice; and the designation of a Hebrew month as Tamuz—which falls about our August—seems to favor this opinion.

TAMMY, or TAMIS, n. *tăm'mĭ* [F. *tamis*—from Dut. *tems*, a sieve]: thin worsted stuff, highly glazed; used for ladies' boots, under the name of *Lasting;* it is called also *Durant.* It is used also, undyed, to form sieves for use in cooking, to strain sauces: such a sieve is called Tammy or Tamis.

TAMP, v. *tămp* [a nasalized form of *tap:* Lang. *tapo* clay; *tapio,* tempered clay for wall-building: F. *tampon,* a bung, a stopper; *tamponner,* to bung, to stop]: among *miners,* to fill up a hole bored in a rock for the purpose of blasting it; in *mil.,* to pack the excavation of a mine with clay, etc., after the powder has been deposited, to direct the course of the explosion; to drive in or down by fre-

quent gentle strokes. TAMP'ING, imp.: N. the act or operation of filling a hole bored for blasting; in *mil.*, the act or operation of packing with sand-bags or clay that part of a mine nearest the charge; the material used in tamping (see MINES; BLASTING). TAMPED, pp. *tămpt.* TAM'PER, n. *-pĕr*, one who tamps; an instrument, generally of iron, used in tamping or in packing the earthy substance around the powder in a bore or mine for blasting. TAMPION, n. *tăm'pĭ-ŏn*, or TOMPION, n. *tŏm'-pĭ-ŏn*, wooden plug for closing the mouth of a cannon or mortar to exclude dust and damp; in naval gunnery, wooden bottom for a charge of grape-shot; a stopper, especially for the upper end of an organ-pipe; a stopple.

TAMPA, *tăm'pa:* city, port of entry, and capital of Hillsborough co., Fla.; on Tampa Bay, at the mouth of Hillsborough river, and on the Atlantic Coast Line and Seaboard Air Line railroads, being the gulf terminus of both; about 29 m. from the Gulf of Mexico. It has a good harbor, the best on the western coast of Florida, and it has regular steamer connection with all the large gulf ports, large ports of the West Indies, and with New York and a number of other Atlantic ports. In the vicinity are large mines of phosphate. Lumber and naval stores are largely produced and shipped.

Manufacturing.—The chief manufacturing industry of Tampa is connected with tobacco products. The government census of 1900 gives the total number of manufactories 129, of which over 100 were cigar factories, in which were about 4,000 employees. The capital invested in all the manufacturing plants, in 1900, was $3,935,-647; the amount paid annually for raw material was $3,542,283, and the value of the annual products was $7,481,741. The tobacco used in the factories is nearly all imported from Havana, Cuba. The manufacturing of tobacco in Tampa is largely done by Cuban immigrants.

Commerce.—The amount of tobacco leaf imported into the port of Tampa from Havana has for several years exceeded that of any other United States port except New York. The internal revenue paid by the city in 1903 was $510,066.44, and the custom collections, for the same year, were $1,308,531. The amount of phosphate shipped was 370,794 tons to United States and foreign ports, valued at $2,410,101. The quantity of fruits and vegetables which are being shipped to northern markets is increasing.

Buildings and Municipal Improvements.—Since 1886, when Tampa was made a port of entry, it has grown rapidly. To accommodate its large number of winter guests, many large and beautiful hotels have been erected. Other fine public buildings are the custom-house, the churches, the schools, the banks, and many of the business blocks. The electric car lines connect the suburban sections with the different parts of the

city. The water supply comes from springs; the daily use is 4,000,000 gallons. The pumping capacity of works is 7,000,000 gallons.

Churches and Schools.—There are 18 church buildings. The St. Louis Roman Catholic Church is named in honor of Father Louis Cancer, O.S.D., who was martyred near here by the Indians, about 1590. There are seven public school buildings, including the Hillsborough county high school, established in 1886. Another high school is in charge of the Sisters of the Holy Name, who conduct three parish schools, one in Tampa and one in each of the nearby suburbs, West Tampa and Port Tampa. There is a college for boys, under the management of the Society of Jesus, and five private schools. There are three daily and six weekly newspapers.

Banks.—The four banks have a combined capital of $450,000, deposits amounting to $3,495,632, and a surplus of $467,240.

Government.—The government is vested in a mayor and a city council, elected by the people for terms of two years. The council has 11 members, three being elected at large. There are police, sanitary and public works departments, including a board of health with ample powers to protect the city's interests.

History.—Tampa is the historical landing place of Narvaez and De Soto, of ill-fated early Spanish expeditions. Its first settlement began with the establishment of the United States military post of Fort Brooke, during the wars with the Seminole Indians. It was the seat of small ship-building and salt works during the Civil war, and was captured by federal gunboats. Its recent rapid growth dates from the coming of railroads and cigar factories in 1886. Pop. (1880) 720; (1890) 5,532; (1900) 15,839; (1903) 22,741; (1910) 37,782.

TAM'PA BAY: largest bay in the Gulf of Mexico, on the w. side of the peninsula of Florida; called by the Spaniards 'Espiritu Santo'; now divided into Old Tampa Bay and Hillsborough Bay. It is 35-40 m. long, 6-15 m. wide, and 15-20 ft. deep at its bar, and is made a safe harbor by a line of keys which protects it from storms. At the entrance is a brick light-house 86 ft. high.

TAMPAN, *tăm'păn:* a tick of s. Africa, remarkable for its very poisonous bite; found in Angola and the country southward, and described by Livingstone in his *Travels.* It attacks by preference the parts between the fingers or toes. It attains the size of a pea, and when it has satiated itself with blood is of dark-blue color, and its skin so tough that it cannot be burst by sqeezing with the fingers. The first effect of the bite is a mingled sensation of pain and itching, which ascends the limb until it reaches the abdomen, and soon causes either violent vomiting and purging or fever. The tingling sensation lasts for a week.

TAMPER, v. *tăm'pėr* [a form of TEMPER: probably a a metaphor from the *tempering* of clay]: to meddle; to deal with or influence unfairly and secretly; to try little experiments. TAM'PERING, imp.: ADJ. trifling; meddling: N. the act of meddling with or influencing secretly. TAM'PERED, pp. *-pėrd.* TAM'PERER, n. *-pėr-ėr,* one who tampers.

TAMPICO, *tâm-pē'kō, or* SANTA ANNA DE TAMAULIPAS: seaport of Mexico, state of Tamaulipas, on the Panuco, 5 m. from its mouth in the Gulf of Mexico. Its streets are broad and regular. It has a custom-house. A breakwater and jetties make the harbor a good one, and ocean vessels enter it. Hides, tallow, bones, and salted meat are exported to the United States and Great Britain. Annual imports amount to about $3,220,000; exports—greatly varying—about one-third to one-half as much.

TAMPION, n. See under TAMP.

TAM-TAM, n. *tăm'tăm',* or TOM-TOM, n. *tŏm'tŏm'* [Hind. *tom tom,* imitative of the sound of a drum]: drum flat at one end, and convex or round at the other, resembling a tambourine, but larger, and oval instead of round—used in the East Indies and w. Africa, made of various materials, and very sonorous. It has been used occasionally in orchestras.

TA'MUS. See BRYONY.

TAM'WORTH, Australia: an inland town of New South Wales, in the n.e. part of the state, on the railroad from Sydney to Brisbane. It is the centre of an agricultural and mining district. Pop. (1901) 5,799.

TAN, n. *tăn* [F. *tan,* bark of oak: Bret. *tann,* oak: Ger. *tanne,* a fir-tree]: bark of the oak, willow, and other trees, which abounds in tannin, crushed and broken in a mill, used for turning skins into leather (see LEATHER): a yellowish-brown color: ADJ. of yellowish-brown color like tan: V. to convert skins into leather by steeping them among water and the bark of the oak, willow, etc.; to make tawny or brown by exposure to the sun: *familiarly,* to thrash. TAN'NING, imp.: N. process of turning skins or hides into Leather (q.v.). TANNED, pp. *tănd:* ADJ. made brown by exposure to the sun. TANLING, n. *tăn'lĭng,* in *OE.,* one who has been browned by the heat of the sun. TAN'NABLE, a. *-nă-bl,* that may be tanned. TAN'NER, n. *-nėr,* one who tans hides. TAN'NERY, n. *-ĭ,* a place where the operations of tanning are carried on. TANNIN (see below: also TANNIC). TAN-BED, a bed of waste tan. TAN-PICKLE, brine for tanning. TAN-PIT, a vat or pit in which hides are laid among tan. TAN-YARD, a place where the tanning of skins is carried on.

TANA, British East Africa: a river rising on the slopes of Mount Kenia, and flowing southeast into the Indian ocean. It is navigable for light-draught vessels about 350 m. to Hameye, just below the Hargazo Falls.

TANAGER, *tăn'a-jėr:* name applied popularly to

North American birds of the genus *Piranga,* family *Tanagridæ,* which may be characterized as finch-like, but with a notch either slight or strong in the upper mandible. The Scarlet Tanager (*P. rubra*) is scarlet with black wings; the Rose Tanager, or Summer Red-bird (*P. æstiva*) is all rose-red; but the females of both species are yellow and greenish. The Louisian Tanager (*P. ludoviciana*) of w. North America is yellow and black, with the head crimson. The Hepatic Tanager (*P. hepatica*) is named from its liver-color. The genus *Tanagra* and many other genera, including hundreds of species, are new world tropical, and mostly very brilliant in color. *Euphonia elegantissima,* blue, yellow, and black, is found as far n. as the s.w. border of the United States.

TANAGRA, *tăn'a-gra,* Greece: an ancient town of Bœotia, on the left bank of the Asopos, 15 m. e. of Thebes, the scene of a battle in 455 B.C. between the Athenians and the Spartans, in which the latter were victorious. Tanagra, now called Gremada, is a scene of ruins. Excavations since 1873 have brought many interesting objects to light, especially the beautiful painted terra cotta draped female figures from 6 to 9 inches in height, known as Tanagra figurines.

TANANARIVO. See ANTANANARIVO.

TANARO, *tâ-nâ'rō:* a river of Italy known anciently as Tanarus. It rises in the Ligurian Alps, in n.w. Italy, flows past Asti and Alessandria, and empties into the Po 10 m. n.e. of Alessandria; length 125 m.

TANAUAN, *tâ-â'wân,* Philippines: (1) pueblo, province of Batangas, Luzon; in the n.e. part of the province; 24 m. n. of Batangas. It is on the main road to Manila. It is the centre of a sugar and tobacco raising and fruit growing country, and has large markets. There are good schools. Pop. 20,040. (2) Pueblo, province of Leyte, on the n.e. coast, on San Pedro and San Pablo Bay; 9 m. s. of Tacloban. It is on the coast road. Pop. 18,510.

TAN'CHEL, or TANQUELIN: a fanatic who arose in the Netherlands about 1115, who proclaimed himself Son of God, and had many followers. He was killed at Antwerp in 1125 and those who believed in him, known as Tanchelmians, or Tanquelinians, were converted back to the Roman Catholic faith.

TANCRED, *tăng'sred,* COMTE DE LECCA: last Norman king of Sicily (reigned 1189-94); illegitimate grandson of King Roger. He succeeded William the Good, son and successor of William the Bad, and though he left the throne to his son, William the Third, Emperor Henry, of Germany, conquered Sicily and the Italian provinces, assumed the crown, and at his death (1197) left it to his son.

TANCRED: prince of Sicily, and one of the heroes of

the first crusade; 1078-1112, Dec. 6; son of Endes, a Norman baron, and of Emma, sister of Robert Guiscard (see GUISCARD). The first authentic information respecting him is that he raised a large body of men in Apulia and Calabria, and joined his cousin, Bohemond, then on his way to the first crusade. The two cousins landed in Epirus, and first one and then the other made their submissions to the Greek emperor, Alexis. Tancred's exploits on the way to Syria; his quarrel with Baldwin for the possession of Tarsus, and his subsequent chivalrous forbearance to, and rescue of, his rival; his wondrous valor before Antioch, where he killed 700 infidels, transmitting the heads of 70 to the pope, and receiving a corresponding number of marks of silver in return; his vigorous repulse of the first sortie by the infidels from Jerusalem; his sad and lonely vigil on the Mount of Olives; and his gallantry at the storming of the sacred city—all are detailed by the numerous chroniclers of this epoch, with their usual extravagant laudation, but with a harmony which indicates the general high estimate of his character. He was one of the claimants of the throne of Jerusalem, and was pacified by Godfrey, the successful competitor, with the gift of some towns in Palestine, and the principality of Galilee or Tiberias. A brief quarrel with Baldwin after Godfrey's death, petty combats with the infidels, and occasional wars with the other Christian princes who had settled in Syria and Palestine, occupied the remainder of his life.

TANDEM, ad. *tăn'dĕm* [L. *tandem*, at length, at last]: singly; one before the other—applied to horses harnessed one before another instead of abreast: N. two horses harnessed *tandem* in a light two-wheeled vehicle. Bicycle or tricycle carrying two persons, one behind the other.

TANDOLANOS, *tä-dō-lä'nōs:* a wild Philippine tribe of Malay origin living on the w. coast of Palawan, between Punta Diente and Punta Tularan.

TANDUBATO, *tän-dô-bä-tō'*, Philippines: one of the larger islands of the Tawi Tawi group, of the Sulu archipelago, lying off the n.e. coast of the island of Tawi Tawi; length n. and s. 6 m.; greatest width 5 m.; area, 10 sq.m. The island is mountainous, Tandubato peak in the n.e. having an elevation of 528 ft.

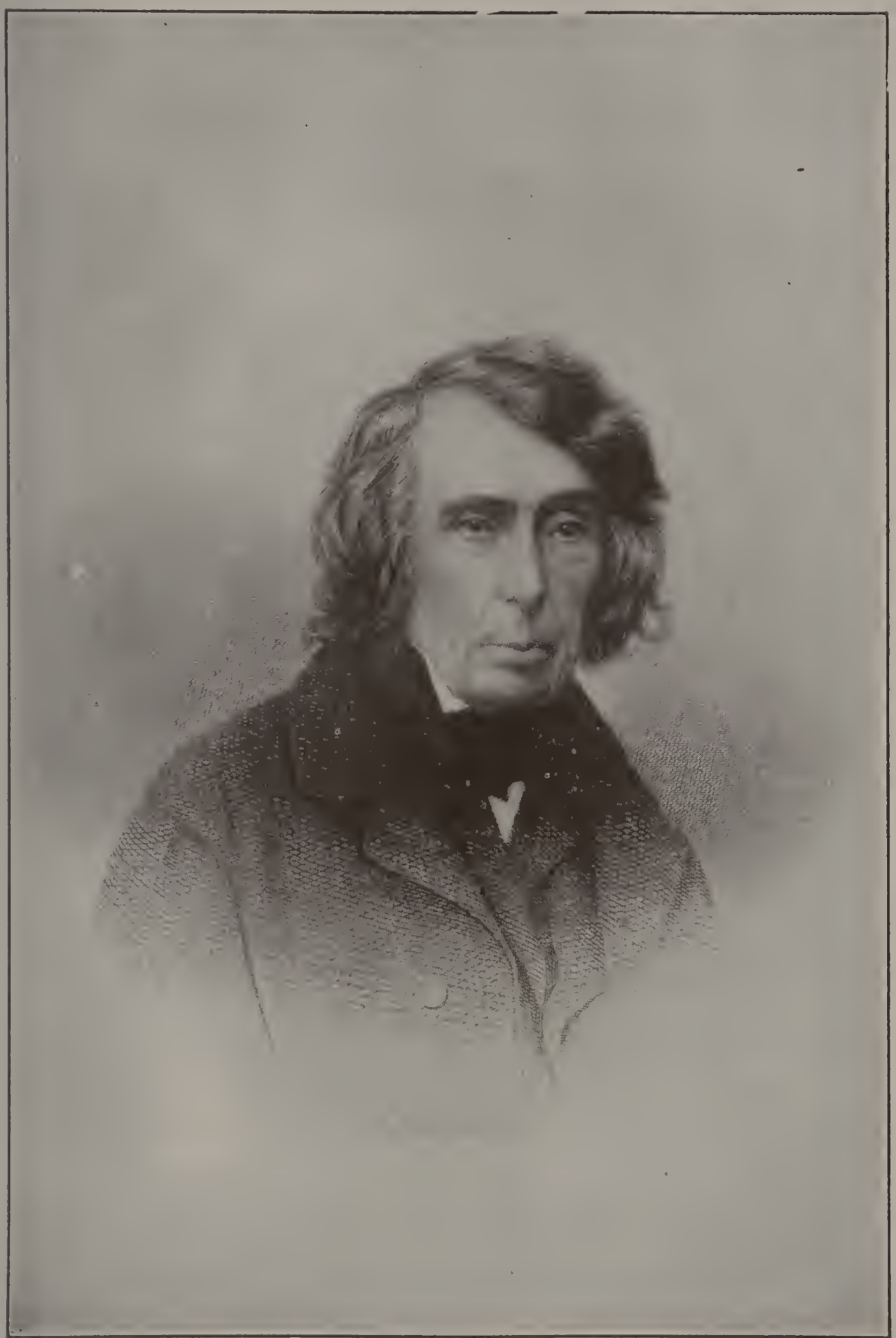
TANEY, *taw'nĭ*, ROGER BROOKE, LL.D.: chief-justice of the U. S. supreme court: 1777, Mar. 17—1864, Oct. 12; b. Calvert county, Md. He graduated at Dickinson College 1795; practiced law in his native place and Frederick; was a member of the Md. assembly and senate; and removed to Baltimore 1822. He was appointed atty.-gen. of the state 1827, and of the United States 1831 under President Jackson, who transferred him to the secretaryship of the treasury 1834, in which office he removed the U. S. deposits to local banks, his dismissed predecessor having refused so to do. The senate, how-

ever, would not confirm his nomination to the treasury, nor in 1835 to a seat as associate justice of the supreme court. In 1836 a Jacksonian majority confirmed his nomination as successor to Chief Justice Marshall. His name is associated chiefly with his decision in the case of Dred Scott—a slave who gained freedom when removed by his master from Missouri to Illinois, and afterward was taken to Wisconsin territory, whence he returned to Missouri, where, claimed as a slave, he appealed to the courts as having been freed by his master's act. The chief justice agreed with a majority of his associates that Dred Scott, not being a citizen, had no standing as plaintiff before the U. S. circuit court of Missouri, and further reviewed history to show that negroes had always been regarded as being 'so far inferior that they had no rights which the white man was bound to respect,' and therefore that they were not of the people who were included in the declaration of independence. This denial of any rights to the negro which the white man is bound (legally) to respect, though agreeing with slave-laws in the southern states, shocked the conscience of the north, and led to the election of Lincoln. Taney further held that the limitation of the bounds of slavery in the Missouri Compromise was unconstitutional; and that Dred Scott lost his freedom by removal to Wisconsin territory and to Missouri. His subsequent rulings were in keeping with this, and were in conflict with the action of free-state courts and of President Lincoln. He died on the day that Maryland abolished slavery. As chief justice, he brought system into the procedure of the Supreme Court, which it had lacked under Marshall Weak sight and bad health made writing difficult for him and the opinions of the court were usually written by one of his ambitious associates. He retained his mental powers to the last, in spite of wretched health. In person, he was tall and thin, with an appearance of great physical weakness; in disposition quiet, cheerful, and studious. Consult Van Santvoord, *Sketches of the Lives and Judicial Services of the Chief Justices of the United States* (1853); S. Tyler, *Memoir of Roger Brooke Taney* (1876).

TANG, n. *tăng* [a metaphor from a ringing sound: F. *tan-tan,* a cattle-bell: Sp. *tangir,* to play on a musical instr.: Maori, *tangi,* cry, sound: Ar. *tanin,* sound, noise]: a rank taste, as of something extraneous; relish; something that leaves a pain; a sound; a tone; a twang: V. in *OE.,* to ring with. TANG'ING, imp. TANGED, pp. *tăngd. Note.*—'*Twang* and *tang* are both used for a loud ringing sound and a strong taste.—Wedgewood.

TANG, n. *tăng* [Icel. *tangi,* a narrow tongue of land: Gael. *teanga,* a tongue]: the part of a knife, fork, or file, or the like, which runs up into the handle; the tongue of a buckle.

TANG, n. *tăng:* sea-weed. See TANGLE 2.



ROGER B. TANEY.

TANGANYIKA, *tân-gân-yē'kâ:* lake in e. central Africa, between lat. 3° and 9° s.; long. of centre 30° e., about 600 m. from the e. coast of Africa; length about 420 m.; breadth 15 to 60 m.; longest fresh-water lake in the world; 12,650 sq. m.; about 2,700 ft. above sea-level. It occupies an enormous crevasse, and its depth in some places exceeds 1,000 ft. It is bordered by hills and mountains, some of which rise 5,000 to 10,000 ft.—giving grandeur to its shore scenery. It was discovered by Speke and Burton 1858. Livingstone, Baker, and others who visited it, deemed it connected with the Albert Nyanza, and a feeder of the Nile; but Cameron surveyed the s. and w. coasts 1874, and discovered an outlet, the Lukuga, on the w. side, which was considered to point toward a connection with the Congo. In 1876 Stanley satisfied himself that this channel, which (later) he proved to communicate with the Lualaba or Upper Congo (see CONGO), is generally dried up in certain parts of its course, and carries the overflow of T. westward only at intervals of years. Thomson reaffirmed the connection between T. and the Congo by the Lukuga. Hore, who spent more than two years on the shores of the lake, found the height of the surface 1879, Mar., 2,700 ft. above sea-level; 1880, Aug., he found that the water had fallen 10 ft. 4 in.: he believes that the lake had for several years been rising to the former, apparently its highest level; that the obstructions in the Lukuga had then been carried away, and so the water had again found its way to the Congo. About 120 rivers and streams flow into the T.—the most important, the Malagarasi, near Ujiji. Except when several rainy seasons follow one another, the evaporation keeps the water at about the same level.—See *Proceedings of the Geog. Soc.*, 1882.

TANGENT, n. *tăn'jĕnt* [F. *tangente*, a tangent—from L. *tangens* or *tangen'tem*, touching—from *tango*, I touch]: in *trig.* and *geom.*, straight line which touches a circle or curve, but when produced does not cut it (see TRIGONOMETRY): ADJ. in *trig.* and *geom.*, touching. TAN'GENCE, n. *-jĕns*, or TAN'GENCY, n. *-jĕn-sĭ*, a contact or touching. TANGENTIAL, a. *tăn-jĕn'shăl*, of or relating to tangents; having a tendency, while moving in a curve, to fly off in a straight line. TANGEN'TIALLY, ad. *-lĭ*. TANGENT SCALE, a slip of metal divided into degrees and quarter-degrees, placed to slide in a groove on a gun to enable the person aiming to give the necessary elevation.

TANGHIN, *tăn'gĭn* (*Tanghinia venenifera*, or *Cerbera Tanghin*): tree of nat. order *Apocynaceæ*, native of Madagascar. The fruit is a drupe, of which the kernel is so deadly a poison that, though not larger than an almond, one kernel is sufficient to kill 20 people. It was used in Madagascar as an ordeal for discovery of guilt or innocence, with the general result of the death of those subjected to it. A little of the powdered kernel was placed on the tongue of the suspected person, and he was obliged to swallow it: only those recovered whose stomachs quickly rejected the dose. The progress of Christianity in

Madagascar has led to discontinuance of this ordeal. A similar poison-ordeal is used in parts of Africa. See ORDEAL: ERYTHROPHLÆUM.

TANGIBLE, a. *tăn'jĭ-bl* [F. *tangible*—from L. *tangib'ĭlĭs*, tangible—from *tango*, I touch: It. *tangibile*]: that may be touched; perceptible by touch; that may be possessed or realized; evident. TAN'GIBLY, ad. *-blĭ*. TAN'GIBIL'ITY, n. *-bĭl'ĭ-tĭ*, the quality of being perceptible to the touch. TAN'GIBLENESS, n. *-bl-nĕs*, the state or quality of being tangible.

TANGIERS, *tăn-jērz'*, or TANGIER, *-jēr'*: seaport of Morocco, on a small bay or inlet of the Straits of Gibraltar, 38 m. s.w. of the town of Gibraltar. The town, on two hills, presents a fine appearance from the sea; but is small and ill-built, the houses—except the residences of foreign officials—being mean, and the streets narrow and dirty. The town is surrounded by old walls, and protected by several forts. The harbor is merely a roadstead, but is the best in Morocco; and there is an extensive shipping-trade—the annual value of entering and clearing cargoes being stated at about $3,000,000.—T. was taken by the Portuguese 1471, ceded to the English 1662, and held by them 22 years.—Pop. estimated about 30,000.

TANGLE, v. *tăng'gl* [probably the same word as TANGLE 2: to *tangle* is 'to keep twisting together like *seaweed*'—Skeat]: to knit together confusedly, as a thread; to interweave so as to make it difficult to unravel; to involve; to complicate; to embarrass; to be entangled; in *OE.*, to ensnare; to trap: N. a quantity of thread or other things confusedly intermingled; perplexity. TAN'GLING, imp. *-glĭng*. TANGLED, pp. *tăng'gld*: ADJ. united confusedly; entangled. TAN'GLY, a. *-glĭ*, knotted; intertwined.

TANGLE, n. *tăng'gl*, or TANG, n. *tăng* [Icel. *thöngull*; Ger. and Dan. *tang*, seaweed]: common name of *Laminaria digitata* and *L. saccharina*, two species of broad-leaved seaweed, natives of British shores, growing on rocks in deep water; called sometimes Oar-weed. The stem is woody; the frond long, ribbon-shaped, leathery, flat, and without midrib. The young stalks are an article of food, as they secrete much gelatinous matter. *L. potatorum*, a large species, supplies the aborigines of Australia with instruments, vessels, and food. TAN'GLY, a. *-glĭ*, covered with the seaweed called tangle.

TANGRAM, n. *tăng'răm*: a Chinese toy, consisting of a square of thin wood or other material cut into seven pieces of different sizes and shapes, with which, by combination, a great variety of figures can be formed.

TANHÄUSER, or TANNHÄUSER, *tăn'hoy-zĕr*: subject of one of the most celebrated German legends of the middle ages; a knight who, in his travels, comes to Venusberg (q.v.), and enters the cave-palace, to behold the wonders of the Lady Venus and her court. After a period there in every kind of delight, his conscience smites him. Invoking the Virgin Mary, he obtains leave of absence, and makes a pilgrimage to Rome, to seek from Pope Ur-

ban, through confession and penance, remission of his sins, and escape from damnation. But the pope, who happens to have a wand in his hand, tells him that he can as little obtain God's mercy as that dry wand can become green again. Thereupon, Tannhäuser departs in despair, and returns to the Lady Venus in the mountain. Three days afterward, however, the wand begins to sprout and bear green leaves; and the pope immediately sends out messengers to every country, but in vain.—Tannhäuser can nowhere be found. Such is the story, as told in the popular ballad formerly common all over Germany and beyond it, and sung in the district of Entlibuch as late as 1830—the best version of which is in Uhland's *Alte hoch- und nieder-deutschen Volkslieder* (Stuttg. 1845). In the preface of the *Heidenbuch*, it is further added that 'the faithful Eckhart'—a character in German heroic legends—sits before the Venusberg and warns the people of its dangers. In this shape the story may be traced as far back as the 14th c.; but the substance of the legend is much older, dating from the days of German paganism. Some traditions connect it with the Hoselberg or Hörselberg, near Eisenach, in which the Lady Holle or Holda held her court, who, on her part, seems identical with Freyja, the Scandinavian Venus. The peculiar mythological meaning of the saga, which has numerous points of contact with many other German traditions, has, however, never yet been thoroughly searched. Grimm sees in it a touching portrayal of the regret that lingered in the popular heart after the departing paganism, and of the sternness of the Christian priesthood in regard to it. Compare Kornmann, *Mons Veneris* (Fkf. 1614); Grässe, *Die Sage vom Ritter Tannhäuser* (1846; 2d ed. 1861). In later times the saga has been put into poetical form, among others by Tieck, and made use of by R. Wagner in an opera. This idea of subterranean (or subaqueous) palaces in which the king or queen of dwarfs, pygmies, fairies, and such folk, held their court, seems to have been very widely spread. Everywhere stories are told of men being enticed to enter, and finding it difficult or impossible ever again to obtain their liberty. See THOMAS THE RYMOUR. The visit of Ulysses to the isle of Calypso, and that of Circe, appear modifications of the same idea.

TANHAY, *tân-hī'*: town, province of Negros Oriental; on the Tanhay River, about two miles inland from its mouth; 15 miles north of Dumaguete. It is near the south entrance to Tañon Strait, and on the coast road. Pop. 12,410.

TANIS (Hebrew, ZOAN): ancient Egyptian city in the northeast of the Delta, before the founding of Alexandria, the chief commercial city of Egypt, capital of the Hyksos kings about 2100 B.C., and of Rameses II. and Mereneptah of the 19th dynasty, who built there a great temple to Set, the god of war. In its ruins 14

obelisks have been unearthed. Its prosperity was destroyed by the silting up of the Tanitic mouth of the Nile, which was named from it, and it was destroyed for rebellion in 174 A.D. The ruins near the fishing village of San el Hager near the south shore of the Lake of Manzaleh were explored first by Mariette, and in 1883-4 by Flinders Petrie.

TANIS, *tā'nĭs:* Tyrian name of the Goddess Astarte.

TANIST, n. *tā'nĭst* or *tăn'ĭst* [Gael. *tanaiste*]: formerly the elected chief of an Irish sept or clan. TANISTRY, n. *tā'nĭs-trĭ,* the ancient Celtic custom of succession, generally described as devolving the right to inherit lands or authority on the oldest and worthiest of the blood. The tanist, or righdomna, was heir-apparent of the chieftainship, whom it was the practice to elect during the lifetime of the sovereign; and there is no doubt that the nearest to the original stock had a preferable claim, as contended by Bruce in his claim to the Scottish throne. The practice of electing a successor applied also to inheritance of land and succession to ecclesiastical offices.

TANITE, n. *tā'nīt* [etym. doubt.]: trade-name of a cement of emery and some binding material, used as a compound for grinding wheels, disks, laps, and in other forms.

TANJORE, *tăn-jōr',* or TANJUR, *-jôr':* important town of Brit. India, capital of the district of Tanjore, presidency of Madras; 180 miles s.s.w. of the city of Madras, in an extensive plain, on one of the branches of the delta of the Cauvery or Kaveri. The town comprises two forts and several suburbs: the forts are so connected as almost to be one. The smaller fort is a parallelogram in shape, 600 yards in extreme length, joined on the north to the larger, which is circular in shape, and 1,100 yards in greatest diameter. The walls of both are lofty and strong, and surrounded by a ditch cut out of the solid stone. Tanjore presents monuments of early Indian civilization which are of high historical importance. The principal edifices are the Great Temple, dating from the 11th c., esteemed the finest in India; and the palace of the rajah. Silks, muslins, and cottons are manufactured. Pop. (1901) 57,870.

The *district* of Tanjore is a part of the Southern Carnatic, 3,654 square miles, coastline 140 miles; known as the garden of southern India. Pop. about 3,000,000, of whom 2,500,000 Hindus, 160,000 Mohammedans, 85,000 Christians (largely Rom. Catholics).

TANK, n. *tăngk* [Port. *tanque,* a pond: Scot. *stang* or *stank,* a pool, a pond: OF. *estanc*—from L. *stagnum,* a pool]: a large cistern for storing water and other fluids; a reservoir of water; that part of the tender of a locomotive which contains the water. TANK-ENGINE, an engine without a tender and carrying its own fuel and water.

TANKARD, n. *tăng'kĕrd* [OF. *tanquard*; O. Dut. *tanckaert*, a drinking-vessel]: a large drinking-cup or vessel with a lid, and made of metal.

TANK'WORMS: worms (*Filariæ*) abounding in the mud of Indian tanks. Some of them closely resemble the guinea-worm infesting the human body. Although there is no positive evidence, there is extreme probability that these tank-worms are the origin of the guinea-worm; and that bathing in water infested with these worms produces the infestation of the guinea-worm. The only difficulty in the theory is that the tank-worms are widely diffused; while the guinea-worm is of restricted occurrence.

TANNAHILL, Robert: Scottish song writer: b. Paisley 1774, June 3; d. there 1810, May 17. He received little education, having been apprenticed to a weaver at an early age, and wrote some of his songs while working at the loom. In 1802 he made the acquaintance of Robert Archibald Smith, a Scottish composer, who set a number of his songs to music. In 1807 he published the first edition of his *Poems and Songs;* a second edition being declined by the publisher, Tannahill became despondent and drowned himself. In 1838 appeared a complete collection of his writings, with a memoir by Ramsay.

TANNER, Benjamin Tucker, a.m., d.d., ll.d.: African Methodist bishop: b. Pittsburg, Pa., 1835, Dec. 25. He was educated at Avery College, Allegheny, Pa., and at Western Theological Seminary. He was editor of the *Christian Recorder* for 16 years, founded and was for four years editor of the A. M. E. *Church Review*, and in 1888 was appointed bishop. He was a delegate to the 3d Ecumenical Methodist Conference held in London in 1901, and has published: *The Origin of the Negro* (1869); *The Negro in Holy Writ; The Color of Solomon —What?;* etc.

TANNER, Henry Ossawa: American artist: son of B. T. Tanner: b. Pittsburg, Pa., 1859, June 21. He studied under Thomas Eakins at the Pennsylvania Academy of Fine Arts. Subsequently removing to Paris, he became the pupil of Jean Paul Laurens and Benjamin Constant. In the Salon of 1896 he received honorable mention and a third class medal in 1897. He was awarded the Walter Lippincott Prize, Philadelphia, in 1900; Second Medal, Paris Exposition, in the same year; and is represented by paintings in the Luxembourg, the Wilstach Collection, and at the Pennsylvania Academy of Fine Arts, Philadelphia.

TANNER, James: American lawyer: b. Richmondville, N. Y., 1844, Apr. 4. He enlisted in the 87th New York volunteers and was soon promoted its corporal. Losing both legs in the second battle of Bull Run, he returned to New York, studied law, and was admitted to the bar

in 1869. He received an appointment at the New York custom house and became deputy collector. From 1877-85 he was tax collector of Brooklyn and in 1889 was appointed United States commissioner of pensions, but later resigned to become a pension attorney.

TANNER, JOHN RILEY: American politician and statesman: b. Warwick county, Ind., 1844, Apr. 4; d. Springfield, Ill., 1901, May 23. He enlisted in the 98th Illinois volunteers in 1863, and was with Sherman's army during its active campaign in Georgia, Tennessee, and Alabama. Returning to Illinois after the war, he engaged in farming and selling fruit trees, entered politics in 1870, as Republican candidate for sheriff, was elected, and held thereafter the offices of circuit clerk 1872-6, State senator 1880-3, United States marshal 1883-5, State treasurer 1886-8, assistant United States treasurer, Chicago, 1892-3, governor of Illinois 1896-1900. He was the recognized leader of the Republican party in Illinois, was the first in Illinois to speak openly for a single gold standard, declaring himself thereon early in 1895, and as governor his administration was able, efficient, and economical. Immediately after the blowing up of the Maine in Havana Harbor, he secured the passage of resolutions in the legislature, tendering to the national government the material and moral support of Illinois in the event of war with Spain, and within 36 hours after the call for troops, he had mobilized 10,000 men at Springfield, thus procuring for Illinois the honor of having the first regiment ready for muster into the national service. His vigorous stand against the importation of contract labor under arms at the time of the Virden riots brought about a storm of protests that his acts were without precedent and unconstitutional. These were met with the answer that he would make precedents and construe the constitution and the law for the welfare of the State.

TANNER, TANNERY, TANNING, TANNED, TANLING, TAN-PICKLE. See TAN; also LEATHER.

TANN'HÄUSER. See TANHÄUSER.

TANNIC, a. *tăn'nĭk* [from TAN]: applied to a peculiar acid found in oak-bark, and more abundantly in gall-nuts, which is very astringent, and has the power of converting the skins of animals into leather. TAN'NATE, n. *-nāt*, a salt of *Tannic Acid* (q.v.). TAN'NIN, n. *-nĭn*, another name for *tannic acid*, the peculiar principle in gall-nuts and oak-bark; a powerful antiseptic or preservative from putrefaction—the same property existing in peat-mosses, derived from the accumulated decay of vegetable substances.

TAN'NIC ACID, or TAN'NIN: synonymous terms, under which chemists include a number of solid non-nitrogenous substances, consisting of carbon, hydrogen, and oxygen—some crystalline, others amorphous—pos-

sessing no smell, but a marked astringent taste. They are soluble in water and alcohol, the solutions being acid, and yielding precipitates with most metallic oxides. A solution of gelatine is also precipitated by a solution of any of the tannic acids, and the gelatigenous tissue in raw hides is by an analogous process converted into leather (q.v.: also GALLOTANNIC ACID). None of these acids are volatile; and when exposed to the action of heat, they decompose and yield the so-called pyro-acids. The persalts of iron yield bluish-black or green precipitates with the tannic acids.

The members of this group are widely diffused throughout the vegetable kingdom. The bark and leaves of most forest trees, e.g., the oak, the elm, the willow, the horse-chestnut, and the pine—and of many fruit trees, e.g., the pear and plum, contain tannic in notable quantity. The wood and bark of many shrubs, e.g., the sumach and whortle-berry, and the roots of the tormentilla and bistort, also are powerfully astringent, owing to the presence of one of the forms of tannic. Coffee and tea, as well as Paraguay tea, likewise contain a modification of this principle. All these bodies, except coffee, precipitate the persalts of iron of bluish-black color; or, if a free acid be present, the solution assumes a dark-green color. The variety of tannin or tannic acid occurring in catechu and kino, produces a green precipitate with the persalts of iron; while that in matricaria, rhatany, and the common nettle, produces a gray precipitate. The principal members of this group are—1. *Gallotannic acid* (q.v.) or *Digallic* or *Tannic acid* (in the ordinary acceptation of the term), obtained mainly from the gall-nut; 2. *Moritannic acid,* or *Maclurin,* obtained from fustic (*Morus tinctoria*); 3. *Quinotannic* or *Cinchonatannic acid,* obtained from cinchona bark; 4. *Quercitannic acid,* from oak bark; 5. *Mimotannic acid,* from catechu; 6. *Kinotannic acid,* from kino; to which some chemists add a variety occurring in coffee and Paraguay tea, to which the term *Caffetannic acid* is given.

TANNJAY, *tân-hī′,* Philippines: pueblo, province of Negros Oriental; on Tañón Strait near its southern entrance; 15 miles north-northwest of Dumaguete. It is on the coast highway. Pop. 12,410.

TANOÑ, *tâ-ñōn′:* a strait in the Philippine islands between Cebu on the east and Negros on the west; the northern entrance is 20 miles wide, and the southern entrance 5 miles; the length is 103 miles. The shores are steep, and generally free from obstructions; there are a number of important towns on its coasts.

TAN′REC, or TENREC: a genus (*Centetes*) of insectivorous mammals, distinguished by the elongated muzzle and the short rounded ears. The body is covered on the upper surface with spines and bristles; no tail exists. These animals inhabit Madagascar, the most

familiar species being the *centetes ecaudatus*, while other species are the tendrac or spiny tanrec (*C. spinosus*) and the banded tanrec (*C. madagascariensis*). The *C. ecaudatus* is an animal of about the size of the European hedgehog, but with a larger body, the legs being also more elongated. The quills or spines are yellowish at their bases, and black toward the tips. These animals hibernate like the European hedgehogs, and live in burrows, which they excavate by means of their strong claws. They do not, however, possess the power of rolling themselves up into a ball-like form for defense. The food consists of insects, reptiles, etc. All three species are eaten by the natives of Madagascar.

TANSY: a composite herb (*Tanacetum vulgare*), introduced into America from the northern Old World. It is a familiar weed of waste lands and roadsides, probably escaped from old herb gardens, and maintaining its station with vigor—a characteristic which is said to have suggested the Greek name *Athanasia*, 'immortality,' which has been corrupted into 'tansy,' present term. It is a handsome plant, with dark-green, deeply cleft, and pinnatifid, fern-like leaves, numerous on an erect stem about three feet high, which is topped by somewhat dense corymbs of flat, button-like, gold-colored heads of rayless florets. It has a rank odor, and bitter, aromatic flavor, which caused it to be formerly used as a seasoning herb, a practice now practically obsolete. The acrid juice contains a volatile oil that is very poisonous, yet tansy was a popular anthelmintic and stomachic drug, and still holds a place in materia medica as an aromatic bitter, and irritant narcotic; it is employed to relieve the pain of ulcers, bruises, and rheumatism. White tansy is the sneezewort; and several other plants of similar aspect are also called tansy; while *Potentilla anserina* is the goose-tansy.

TANT, n. *tănt* [from *taint*, to stain]: a small field-spider of an elegant scarlet color.

TANTA, Egypt: capital of the province of Gharbîeh, in the Delta, about 50 miles by rail northwest of Cairo. It has large public buildings, a palace of the Khedive, bazaars, the modern and much frequented mosque of the popular saint Seiyid Ahmed el-Bedawi, and three important annual fairs. Pop. 57,289.

TANTALITE—TANTALATE. See TANTALUM.

TANTALIZE, v. *tăn'tă-līz* [L. *Tantălus;* Gr. *Tantălos*, an anc. king, who, having divulged the secrets of Jupiter, was punished in the lower world by having branches laden with fruit hung over his head, which always receded from his grasp, while a rock above threatened to crush him every moment; he was also placed up to the chin in water and yet could not drink]: to tease or torment by presenting some object of pleasure or desire just within

reach, to be again placed beyond it; to excite expectations or fears which will not be realized; to tease; vex; irritate; provoke. TAN'TALIZING, imp.: ADJ. irritating or tormenting after the manner in which Tantalus suffered. TAN'TALIZED, pp. *-līzd.* TAN'TALIZER, n. *-lī-zér,* one who tantalizes. TAN'TALIZINGLY, ad. *-lĭ.* TANTALIZATION, n. *tăn'tă-lī-zā'shŭn,* the act of tantalizing; the state of being tantalized. TAN'TALISM, n. *-lĭzm,* the punishment of Tantalus; a teasing or tormenting.

TANTALUM, *tăn'ta-lŭm* [from *Tantalus*] (symb. Ta, at. wt. 182): metallic element discovered 1803 in two Swedish minerals, tantalite and yttrotantalite. Metallic tantalum is obtained by heating fluotantalate of potassium with metallic sodium in a close iron crucible, and washing out the soluble salts with water. It is a black powder, which, when heated in air, burns brightly and is converted into tantalic oxide. Tantalum is refractory to all acids, except hydrofluoric (dissolving slowly in warm aqueous hydrofluoric acid) and a mixture of the latter acid with nitric acid; in this it dissolves very rapidly. Tantalum has no economic use. *Tantalite* occurs with beryl, columbite, samarskite, and garnet in North Carolina, and in decomposed granite in Alabama; it is essentially a tantalate of iron, manganese, etc., as yttrotantalite is a tantalate of yttrium, containing also uranium, calcium, iron, and other metals.

TANTALUS, *tăn'ta-lŭs:* character noted in Greek mythology and legend for his punishment in the lower world. He is said to have been the son of Zeus by Pluto; and some legends describe him as king of Argos or Corinth; others relate that he dwelt in a palace on Mt. Sipylus, and was a guest at the table of the gods. Various reasons are assigned for his severe punishment, the most common being, that he divulged the divine counsels of Zeus, which the latter had communicated to him as secrets. In the lower world, he was afflicted with insatiable thirst, and had to stand up to the chin in a lake, the waters of which receded from him whenever he tried to drink. Clusters of fruit hung over his head, which the wind wafted from his grasp whenever he sought to pluck them—his mind meanwhile being kept in constant terror lest a huge rock suspended above his head, and ever threatening to fall, should crush him. Tantalus, or rather his punishment, has supplied the Eng. language with the verb 'tantalize.' Tantalus was father of Pelops, Broteas, and Niobe.—The tomb of Tantalus on Mt. Sipylus was pointed out in antiquity near Magnesia.

TAN'TALUS: genus of birds of family *Ardeidæ,* resembling storks in feet and bill, except that the ridge of the bill is rounded, and its tip gradually curved downward, and slightly notched on each side; a portion of the head, and sometimes of the neck, is bare. The AFRICAN TANTALUS (*T. ibis*) was long regarded as the Ibis of the

anc. Egyptians; but it is rare in Egypt, and belongs chiefly to Senegal; it is much larger than the true ibis. The AMERICAN TANTALUS, or WOOD IBIS (*T. locülator*), is as large as a stork, but more slender, white, with black quill and tail feathers, the naked skin of the head and neck black: it is found both in North and South America—in the United States inhabiting chiefly the swampy districts of the south.

TANTALUS CUP, n. *tăn'ta-lŭs:* philosophical toy consisting of a siphon so adapted to a cup that, the short leg being in the cup, the long leg may go down through the bottom of it. The siphon is concealed within the figure of a man, whose chin is on a level with the bend of the siphon. As soon as the water rises to the chin of the image, it begins to subside, so that the figure, like Tantalus in the fable, is unable to quench its thirst.

TANTAMOUNT, a. *tăn'tă-mownt* [F. *tant;* L. *tantus,* so much, and Eng. *amount,* which see]: equal; equivalent in value or signification.

TANTIA TOPI [the weaver who became an artilleryman]: rebel ringleader during the Indian Mutiny of 1857. He began as a lieutenant of Nana Sahib, but after the flight of the latter into Nepal, he continued the war for several months, being the last rebel in the field, but was finally captured, tried, and hanged in April, 1859.

TANTIVY, ad. *tăn-tĭv'ĭ* [imitative from the sound of a hunting-horn]: swiftly; speedily—a hunting term: N. a gallop. TO RIDE TANTIVY, to ride at the utmost speed.

TANTRA, n. *tăn'tră* [Skr. *tan,* to believe]: a division of the Hindu sacred books—those of the worshippers of the female energy of the god S'iva: see S'ÂKTAS. A tantra is said to comprise five subjects—the creation and destruction of the world, the worship of the gods, the attainment of all objects, magical rites for the acquirement of six superhuman faculties, and four modes of union with spirit by meditation. A variety of other subjects, however, are introduced. They all are in the form of dialogue between S'iva and his wife, in which the questions of the goddess are answered—especially, and in full, concerning the *mantras,* or prayers and incantations, under solemn cautions that they involve a great mystery, on no account to be divulged to the profane. The efficacy of these *mantras* is deemed all-powerful; so that, according to some Tantras, faith in these revelations of S'iva frees from the consequences of the most atrocious sins. The followers of the Tantras rank them as a fifth Veda of equal antiquity and superior authority. Such an antiquity, or one approaching it, is entirely imaginary. Their date is unknown, but there is negative evidence against a date as early as the first centuries of the Christian era.—See H. H. Wilson, *A Sketch of the Religious Sects of the Hindus,* and the works of Barth (1882) and Monier Williams.

TANTRUMS, n. plu. *tăn'trŭmz:* in *familiar language,* childish ill-humor, with fits of passion; a burst of ill-humor.

TANTUM ERGO, *tăn'tŭm ĕr'gō* [L., 'So great therefore']: name of the hymn uniformly sung in the Rom. Cath. Church at benediction with the Holy Sacrament; these words being the first words of the penultimate strophe of the hymn *Pange Lingua.* The *Tantum Ergo* is the most popular of the eucharistic hymns.

TANZIMAT, or TANSIMAT, n. *tăn'zĭ-măt* [plu. of Ar. *tansim,* a regulation]: the organic laws established by the Hatti Sherif of Gulhane, in accordance with which the administration of the Turkish empire is carried on. These organic laws, the first attempt at constitutional government in Turkey, were published by Sultan Abdul-Medjid 1844; and treat of—(1) the political organization of the empire, and the powers and jurisdiction of the chief officials and higher courts; (2) administration and finance; (3) justice; (4) military affairs. But the tanzimat was a dead letter, or nearly so, except in connection with the army; so that 1854, Sep. 7, the sultan found it necessary to publish a new ordinance, commanding the complete carrying out of the tanzimat; for securing which a commission was appointed.

TAOISM, or TAOUISM, n. *tā'ō-ĭzm* [Chin. *taou,* the way]: one of the three great religions of China, whose doctrines constitute a transcendental and speculative rather than a practical system; founded by the Chinese sage *Lao-tsze,* (q.v.: see also CHINA): the other two systems are *Confucianism* and *Buddhism.* This form of belief is most widely prevalent among the lower orders of the people and is mixed up with many Buddhistic elements, including the doctrine of metempsychosis. Its adherents worship numberless divinities and genii, the head of whom is Juwhangshangti, 'Exalted Monarch'; among the genii are the Pahsien (8 genii), over whom is Scheusing, 'the God of Long Life.' At the head of the priesthood is the Thientse, 'master of heaven,' being himself a sort of Mahatma, or incarnation of Juwhangshangti, who lives on the northern borders of Lungfushan ('the Mountain of Dragons and Tigers'), although he exercises no active influence over his followers. There is an extensive literature connected with this creed, but it is no longer so highly esteemed as in earlier days. TA'OIST, or TA'OUIST, n. *-ĭst,* believer in Taoism.

TAORMINA, *towr-mē'nâ* (anc. *Tauromenium*): town on the east coast of Sicily, province of Messina, on a narrow ledge of rock, 900 ft. above the sea, about 30 m. s.w. of Messina. It consists mainly of a single street, more than a mile in length; is surrounded by a Saracenic wall; has numerous convents and churches, many picturesque palaces and mansions built in the middle

ages, and numerous relics of antiquity, among which are fine sepulchres, an aqueduct, tessellated pavements, remains of a 'Naumachia' and of a theatre: the last reckoned one of the most splendid ruins in Sicily, and commanding a view of a magnificence scarcely paralleled in the world. Taormina has trade in wine and hemp. Pop about 3,000.

Ancient *Tauromenium* was built at unknown date after the destruction of Sicilian Naxos B.C. 403: it rapidly attained prosperity.

TAP, v. *tăp* [F. *tape,* to tap: Low Ger. *tappen,* to grope, to fumble: Bohem. *tepati,* to strike with a hammer]: to strike with something small; to strike a gentle blow; to pat; to touch lightly: N. a gentle blow; a slight stroke. TAP'PING, imp. TAPPED, pp. *tăpt.*

TAP, v. *tăp* [Low Ger. *tappe;* Ger. *zapfen;* Dut. *tap,* a plug thrust in to stop a hole: Sw. *tapp,* a tap, handful, wisp]: to pierce or broach, as a cask, and to insert a tap; to bore into: to pierce for letting out a fluid, as in surgery (see TAPPING): N. pipe with a handle through which liquor is drawn; plug or spill for stopping a hole pierced in a cask; *familiarly,* the liquor; place in a public-house or tavern where liquor is drawn for drinking; a conical screw made of hardened steel, and grooved, for cutting internal threads in nuts and the like. TAP'PING, imp.: N. act of opening a cask of liquor by the insertion of a tap: surgical operation of removing fluid from the body, as in the disease of dropsy. TAPPED, pp. *tăpt.* TAPSTER, n. *tăp'stėr,* one whose business is to draw liquor from the cask. TAP-BOLT, a bolt with a head on one end and a thread on the other. TAP-HOUSE, house where liquors are retailed. TAP-ROOM, or THE TAP, common drinking-room of a public-house. TAP-ROOT, in *bot.,* main root of a plant, which descends deeply in a tapering undivided manner. ON TAP, with a tap in the barrel, and so ready to be drawn, as ale *on tap.* TO TAP TELEGRAPH WIRES, to intercept intelligence in course of transmission by telegraph.

TAPAJOS, *tâ-pâ'zhōs:* important river of Brazil, an affluent of the Amazon; formed by confluence of the Arinos and the Juruena, both rising in the s. of the province of Matto Grosso. After a northward course more than 1,100 m. in length, the Tapajos falls into the Amazon, about 20 m. below the town of Santarem. In lat. about 7° 30′ s., it has a fall of 30 ft.; but the interruptions to the navigation, which is said to reach to within a short distance of its source, are few. A portage of only 18 m. separates the upper waters of the Tapajos from those of the Paraguay. After it enters the state of Para it is a broad and deep stream. A few miles above its mouth it broadens into a lake-like expansion 12 m. wide and 75 m. long.

TAPE, n. *tāp* [AS. *tæppe,* a tape, fillet—perhaps from Gr. (see TAPESTRY)]: a narrow band of cotton or linen cloth, used for strings, etc. TAPE-LINE, a narrow band of linen cloth painted, and figured with inches, varying in length from six feet, much used by builders, engineers, etc., in measurements. TAPEWORM, a long flat worm like a tape, bred in the intestines of vertebrate animals; the tænia (see below). TAPEISM, n. *tāp'ĭzm,* or RED-TAPEISM, formal routine; routine, as in a government office carried to excess, often resulting in vexatious delay—so called from the *red tape* employed in tying up papers and documents

TAPE-GRASS (*Vallisneria*): genus of the Frog's-bit family (*Hydrocharidaceæ*); called also Eel-grass; but that name might well be confined to the salt-water *Zostera* of the family *Naidaceæ,* with similar leaves, but with flowers in two rows on a linear spadix. In Tape-grass the staminate clusters of buds, else confined to the bottom of the water, break away and float to the surface, where they open and fertilize the pistillate flowers, which are raised to the surface on thread-like scapes that afterward coil spirally, pulling the fruit under water to ripen. *V. spiralis* is common in slow waters in this country and Europe. Its linear, ribbon-like leaves, obscurely serrate, are used under the microscope to show the wonderful rotation of protoplasm in the vegetal cell.

TAPER, n. *tā'pĕr* [AS. *taper,* a wax-light. Ir. *tapar;* W. *tampr,* a taper: comp. Skr. *tapas,* fire]: a small wax-candle; a long wick coated with wax: ADJ. regularly narrowed toward one end; long and slender, like a wax *taper:* V. to narrow to a point; to become gradually smaller toward the end. TA'PERING, imp.: ADJ. gradually terminating in a point. TA'PERED, pp. *-pĕrd.* TA'PERINGLY, ad *-lĭ.*

TAPESTRY, n. *tăp'ĕs-trĭ* [F. *tapisserie,* tapestry—from *tapis,* a carpet—from mid. L. *tapēcĭus,* tapestry—from L. *tapētĕ,* hangings for covering walls—from Gr. *tapēs,* a carpet, woolen rug]: kind of decorative carpet-work, used for hangings to the walls of rooms, coverings for furniture, and for thrones, chairs of state, etc.; dyed of various colors, and embroidered; called also *arras:* V. to adorn with tapestry, or as if with it. TAP'ESTRYING, imp. TAP'ESTRIED, pp. *-trĭd:* ADJ. adorned as if with tapestry. TAPESTRY CARPET, sort of Brussels carpet in which the warp is so printed beforehand as to produce a figure or design in the completed fabric.—*Tapestry* has been in use from very ancient times; but concerning the art of working it we have little information until the time of the Saracens, who revived it, and brought it into notice. They used T. probably only as drapery or curtains for the courts of their houses: its use as covering for walls seems to have been an invention of the Flemings previous to 1606, at which date it was introduced into France by Henry IV., who engaged Flemish artists to teach the art of it. At that period, so generally was its origin attributed to the Saracens that it was called

Sarrazinois. The oldest piece in existence is that described under the name of the BAYEUX T. (q.v.). At first the Saracenic tapestries were ornamented only with flowers and geometric figures; but the Flemings aimed higher, and sought to enrich them with historic subjects of the highest order; and so important did this art become, that the most eminent masters in painting, from Raphael downward, bestowed their greatest efforts on cartoons to serve as copies for the T.-workers, of which the celebrated Raphael cartoons, formerly at Hampton Court, now in a gallery specially designed for them in the Kensington Museum, are illustrations (see CARTOON). After its introduction into France by Henry IV. at the beginning of the 17th c., the art of making T. does not appear to have made much progress until the middle of that century, when a small establishment founded by the brothers Canaye on the premises formerly occupied by Jean Gobelin, a dyer of wool, was commenced, and was afterward carried on by a Dutchman named Gluck and his assistants with such success that it was suggested by Colbert, minister of Louis XIV., that it should be taken under the king's patronage; in consequence of which the establishment was bought, and constituted a royal manufactory 1667, under the management of Lebrun. A royal carpet manufactory had been established 1615; this was called La Savonnerie, from the previous use of the buildings for manufacture of soap. The Savonnerie and the Gobelins were both carried on with great spirit by successive sovereigns, and were formed into one establishment 1826, when the works of the Savonnerie were removed to the Gobelins, where the work is now brought to great perfection; also at a minor establishment at Beauvais, dept. of Oise, where it is worked in a different style. At the Gobelins, a series of threads are arranged vertically in a frame like the warp of a loom, and the workman stands behind the frame, the pattern being placed behind him for reference. To produce the design, he has a number of wooden needles threaded with wool and silk of the colors required, and these are passed through the upright warp-threads, and brought back, so that each thread becomes covered with the necessary color; and such is the extreme nicety with which this is done, and such the delicacy and multiplicity of the shades of color employed, that little difference can be detected between the T. picture and the painting from which it was copied. At Beauvais, the warp is placed horizontally, and the workman stands over it; this renders it necessary to cut off the ends on the upper surface, which is avoided in the other plan of working from behind. The Beauvais is, however, a style intermediate between T. and carpet-work, and the roughness of surface so produced has a good effect. The modern works of the Gobelins were distributed as presents by the late imperial govt. of France. They are not produced in great numbers, and are of great money value. The number of artists employed is about 120.

TAPETUM, n. *tă-pē'tŭm* [L. *tapētĕ*, a carpet]: in *anat.*, a silvery layer lining a greater or less extent of the back part of the choroid membrane of the eye, in fishes and many mammals.

TAPE'WORM: term properly used in a vague sense to designate any worm of the group *Cestoidea* (see CESTOID WORMS). According to Dr. Cobbold, more than 250 distinct forms of cestoid worms have been described, of which probably somewhat less than 200 may be regarded as really distinct species. These he divides into the three families: (1) *Tæniadæ*, or true tapeworms; (2) *Bothriocephalidæ;* (3) *Tetrarhynchidæ*. For natural history of the tapeworms generally, see CESTOID WORMS. It is to be noted, in preliminary, that every tapeworm passes through several distinct phases during its life-history. 'In the ordinary colonial or tapeworm condition,' says Dr. Cobbold in his work *Entozoa*, 'it has been termed the *strobila* (Van Beneden). The separate joints of which the strobila is composed are denominated *proglottides*, or zooids. The anterior segment forms the *head*, and remains barren, those of the neck and front part of the body being sexually immature during the process of strobile formation. The mature proglottides at the caudal end are capable of realizing an independent existence, and the eggs which they contain develop the six-hooked embryos, or *proscolices* (Van Beneden), in their interior. These latter become metamorphosed into *scolices* or nurses, representing the well-known cysticercal state, which, in its sterile or aborted condition, forms the common *hydatid*.' During the greater part of their existence, the tapeworms are parasitic animals, the mature proglottides and eggs being free during only a comparatively short interval. They are mostly restricted in distribution to the vertebrate animals, comparatively few of the invertebrates (except the cuttle-fish) appearing to harbor them in their adult condition, though the tapeworm larvæ, nurses, or *scolices* probably abound in various invertebrate groups. In the human body, no less than 9 species occur—viz., 6 *true tapeworms* and 3 species of *Bothriocephalus;* and as 4 distinct species have been found in the Barbary ape, it is obvious that errors of diet, due to civilization, are not the cause of these parasites. Among the animals with which we are most familiar, the species are plentiful in the common dog (and in true carnivora generally), in rats and mice. The typical ruminants are almost constantly infested both by mature and by immature forms; while the larger pachyderms, and solidungulates (horse, ass, etc.), harbor only a few adult forms; but only larvæ appear to be known in swine. These worms appear to be as abundant in granivorous birds as in carnivorous hawks, owls, etc. In the water-birds generally, the adult worms are very abundant, their larvæ existing in the food of such birds, in fishes, mollusks, etc. In reptiles these worms are extremely rare,

though other parasitic worms abound; while in fishes they are very abundant both in the adult and in the larval forms.

The *Tæniadæ*, or *true tapeworms*, may be distinguished from the other families of the order *Cestoidea* (cestoids or tapeworms in the popular sense) 'by the possession of a small, distinct head, furnished with four simple oval or round suctorial disks (suckers), and commonly also with a more or less strongly pronounced rostellum (proboscis) placed at the summit in the median line. This prominence, when largely developed, becomes retractile, and when not in use is lodged within a flask-shaped cavity lined by a sheath and supplied with special muscles; it is also very frequently armed with a single or double crown of horny chitinous hooks, there being occasionally as many as five or six separate circular rows of these organs. Attention to the number, relative size, and disposition of the hooks is often sufficient to determine the particular species. In nearly all cases, the reproductive orifices are situated at or near the margins of the joints, which are bisexual.'—Cobbold, *Entozoa.* The 6 true tapeworms occurring in man are: (1) *Tænia solium;* (2) *Tænia saginata* (or *mediocanellata*); (3) *Tænia nana;* (4) *Tænia flavopunctata;* (5) *Tænia madagascarensis;* (6) *Tænia cucumerina.* All of these occur in the adult condition in man, as do also the 3 species of bothriocephalus, *B. latus, B. cristatus, B. cordatus.* But there are four species of *Tænia* which infest the human body in their larval state—viz., *Tænia solium* (larva, *Cysticercus cellulosæ*), *Tænia acanthotrias* (larva, *Cysticercus acanthotrias*), *Tænia marginata* (larva, *Cysticercus tenuicollis*), *Tænia echinococcus* (larva, *Echinococcus*).

Fig. 1.

The double crown of hooks highly magnified.

The *common tapeworm, Tænia solium,* derives its Linnæan title from the idea that it is always a solitary worm; but though this is usually, it is not always the case. The full-grown tapeworm (strobila) has been known from earliest times, and is described by Hippocrates, Aristotle, and Pliny; but its organization and mode of development have been properly understood only in recent years. The segments of which it is composed vary in size, and number 800 to 1,000, the earliest immature ones being extremely narrow, and the sexually mature joints commencing at about the 450th segment. From 10 to 35 ft. may be regarded as representing its ordinary length; its breadth at about the widest part being one-third of an inch. The head is very small and globular

(about the size of a pin's head), with black pigment ingrained in it. Under low magnifying power, it shows four circular sucking disks, in front of which is a conical proboscis, armed with a double crown of hooks, 22 to 28 in each circular row. The head is succeeded by a very narrow neck, nearly half an inch in length, which is continued into the anterior or sexually immature part of the body, in which traces of segmentation appear first in the form of fine transverse lines, which are gradually replaced by visible joints. These joints or segments represent the body, and each mature segment contains both male and female organs of generation; and in addition to these structures, the entire series of joints is traversed by a set of vascular canals constituting the so-called aquiferous system, which consists of two main channels, one passing down either side of the worm, and both connected by transverse vessels which occur singly at one end of every joint. It is only in the alimentary canal of man or some other animal that a tapeworm of any kind can attain sexual maturity; and in all of these the eggs are fecundated before being discharged. The expulsion of the eggs may take place in any of the following ways: First, the mature segments separate from each other, and passing out of the body, either with the ordinary evacuation of the bowels or independently, become decomposed, and set free the inclosed eggs. The single joints thus discharged undergo violent contraction after being expelled, which led to their being formerly mistaken for a distinct species of worm, to which the title *Vermes cucurbitini* was applied, from their resemblance to a pumpkin-seed. Secondly, the eggs may be discharged through the genital pore by pressure from any cause. It is only thus that we can account for the occasional (but very rare) coexistence of a *Cysticercus cellulosæ* (the larva of *Tænia solium*) and an adult tapeworm in the intestinal canal of the human subject—an association which constitutes one of the most serious dangers which the matured worm can inflict upon its host, and one of the strongest indications for its removal. Thirdly, the mature joints sometimes appear to undergo disintegration within the intestine, and to liberate the eggs; but the conditions under which this disintegration occurs are unknown. They are usually expelled from the human bowel at the rate of six or eight a day. Their vitality is prolonged by moisture, which favors distribution of the liberated eggs over grass and other vegetables, or in water, which may be used as food or drink by animals. The eggs, in their mature condition, present a globular figure, and are easily recognized by their remarkably thick shell, which surrounds the six-hooked embryo. They present an average diameter of $\frac{1}{694}$ of an inch, the shell itself measuring about $\frac{1}{4000}$ of an inch in thickness. After a while by accident, as it were, a pig coming in the way of these embryos, or of the proglottides, is liable to swallow them with matters taken in as food. The embryos,

immediately on being transferred to the digestive canal of the pig, escape from the egg-shells, and bore their way through the living tissues of the animal, and, having lodged themselves in the fatty parts of the flesh, they there rest to await their further transformations or destiny. The animal thus infected becomes 'measled,' its flesh constituting the so-called measly pork. In this situation, the embryos drop their hooks, and become transformed into the *Cysticercus cellulosæ*. A portion of this measled meat being eaten by man, either raw or imperfectly cooked, transfers the cysticercus to the human alimentary canal, in which locality the cysticercus attaches itself to the wall of the intestine, and, having secured anchorage, begins to grow at the lower or caudal extremity, producing numerous joints or buds to form the strobila or tapeworm colony.

In the article GENERATIONS, ALTERNATION OF, it was stated that the group of phenomena included in that term would be further illustrated in the history of the tapeworm. From what has been above shown, it appears that we have a simple alternation of generation in which the immediate product of the proglottis (or sexually matured zooid individual) is a six-hooked brood; by metamorphosis, the latter becomes transformed into the cysticercus, having a head with four suckers and a double crown of hooks; and by gemmation, the latter gives rise to a whole colony (strobila) of individuals, the greater part of which are destined to become sexually mature—zooid individuals or proglottides. It will be observed, therefore, that the product of a single ovum is, in the first instance, a single non-sexual embryo; in the second phase, it becomes a non-sexual cysticercus (these two phases together constituting the protozooid); in the third change, it gives off, by budding, numerous gemmules, most of them destined to be sexually mature individuals (or deuterozooids), in this way resembling their original parents. The relation and nature of these developmental changes may be further simplified by placing the various life phases in a tabulated form as follows:

(*a*) Egg in all stages.
(*b*) Six-hooked embryo = proscolex.
(*c*) Resting larvæ, or *Cysticercus cellulosæ* (scolex).
} Protozooid.
(*d*) Immature tapeworm.
(*e*) Strobila, or sexually mature *Tænia solium*.
(*f*) Proglottis (cucurbitinus) = free segment = Deuterzooid.

The common tapeworm may cause disease, and even death, by its aggressions, either in its adult or in its larval stage of existence. A mature tapeworm in the intestinal canal may give rise to a series of anomalous symptoms, including 'vertigo, noises in the ears, impairment of sight, itching of the nose and anus, salivation, dyspepsia, and loss of appetite, colic, pains over the epigastrium and in different parts of the abdomen, palpitation, syncope, the sensation of weight in the abdomen,

pains and lassitude in the limbs, and emaciation.'—Davaine, *Traité des Entozoaires, etc.* Many cases are on record in which hysterical fits, chorea, epilepsy, convulsions of various kinds, and even mania, have been induced by the irritation excited by this parasite, and have ceased at once on its removal. But distressing as these symptomatic phenomena may be, their injurious effects are trifling as compared with the troubles which follow the deposition and growth of the larval form within the body, especially when the cysticerci find a home in the more important vital organs. There are many cases on record in which the cysticercus has caused death by its development within the human brain. In the present state of our knowledge, it is impossible to diagnose these cases; and even if a correct diagnosis were possible, nothing could be done in treatment. Epilepsy, with or without mania or imbecility, is commonly but not invariably present in these cases. 'Cysticerci,' says Dr. Cobbold, 'may develop themselves in almost any situation in the human body, but they occur most frequently in the subcutaneous, areolar, and intermuscular connective tissue; next, most commonly in the brain and eye; and lastly, in the substance of the heart and other viscera of the trunk.' The *adult form of the worm* enters the system as the cysticercus of measly pork; and to eat raw or underdone measly pork is an almost certain means of introducing this parasite into the body. It is satisfactory to know that the temperature of boiling water is sufficient to destroy the vitality of the measles; and that in ordinary salted pork, and in hams, they are destroyed by action of the salt in one case, and of the combined salt and smoke in the other. Sausages, into which measly pork may find its way, are rendered safe if they are cooked till no pink, raw-like, fleshy look can be seen in their centre. The *larval worm* may gain access into the human body by the mature eggs of the tapeworm being swallowed. Those who, as students of this department of natural history, handle fresh tapeworms, are perhaps especially liable to this misfortune; but edible parts of vegetables eaten uncooked, fallen fruits, etc., and drinking-water, near human habitations or where night-soil has been used as manure, may convey the eggs to the stomach.

The tapeworm next in importance to *Tænia solium* is *Tænia saginata* or *mediocanellata*, which was established as a distinct species first by Küchenmeister. It exceeds and the thickness of the individual segments; also the head is somewhat larger, abruptly truncated at the crown, destitute of proboscis and hook apparatus—hence this species has been described as the *hookless tapeworm*—but furnished with very large sucking-disks, surrounded by much dark pigment, which gives the head a blackish appearance. Leuckart has proved by experiment that the measles or cysticerci which produced this worm are found

in the muscles and internal organs of cattle. He administered proglottides of *T. saginata* to three calves, a sheep, and a pig. In the two last-named animals they produced no effect, as was shown by post-mortem examinations; while in the calves they produced a kind of leprosy, since characterized as 'acute cestoid tuberculosis,' and which proved fatal if too large a dose of eggs had been administered. On examining one of these animals after its restoration to health—48 days after the eggs were swallowed—he found numerous cysticercus-vesicles, larger and more opalescent than those of the pig, lodged within the muscles; and as the heads of the contained cysticerci exhibited the distinctive peculiarities presented by the head of the adult worm, 'we are supplied with the most unequivocal evidence that man becomes infested with this second form of tapeworm by eating imperfectly cooked veal and beef.' Until Küchenmeister established the species *Tænia mediocanellata* (*saginata*), the two above-described species were commonly included under *Tænia solium*, from lack of due examination, especially of the head.

Fig. 2.

Head of *Tænia mediocanellata*, magnified about 35 diameters. (From Cobbold.)

The other species of man-infesting tapeworms are not of frequent occurrence. Of the species which infest man in their larval state, *Tænia echinococcus* is probably more fatally injurious to the human race than all the other species of entozoa together. In its mature (strobila) condition, in which it is found in only the dog and the wolf, it seldom exceeds a fourth of an inch in length, and develops only four segments, including that of the head. The final segment, when sexually mature, equals in length the three anterior ones, and contains as many as 5,000 eggs. Of 373 cases of the echinococcus parasite occurring in man, collected by Davaine, 165 affected

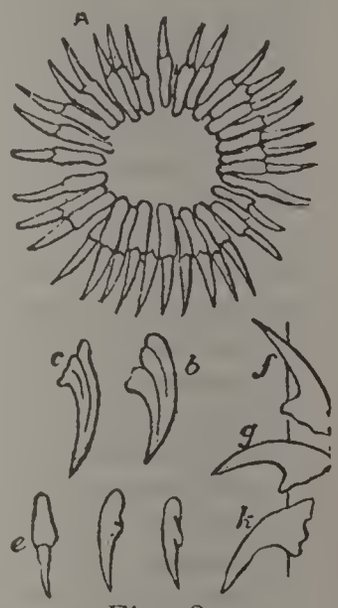


Fig. 3.

A, magnified view of the circle of hooklets, seen upon its under surface, thirty-four in number: *b*, *c*, lateral views of the separate hooklets; *e*, hooklets seen on the inferior or concave border; *f*, *g*, *k*, illustrate the movements and position of the hooklets, the vertical line running through the fixed point of each of the three hooks.

the liver, 40 the lungs, 30 the kidneys, 20 the brain, and 17 the bones, while the remainder were spread over other parts; and of 136 cases collected by Cobbold, 51 affected the liver, of which last (51) less than 35 cases recovered.—For an excellent abstract of the remarkable series of experiments by which the relationship between the so-called cystic worms and the cestoid worms was established, see Aitken's *Science and Practice of Medicine*, I.; while for the subject of T. generally, the highest authorities are the works of Küchenmeister and Siebold translated by the Sydenham Soc.; Davaine's *Traité des Entozoaires;* Weinland's *Essay on the Tapeworms of Man*; Cobbold's *Entozoa;* and Leuckart's *The Parasites of Man* (Eng. transl. 1886).

For the means of expelling tapeworms when they have found lodgment in the human intestinal canal, see VERMIFUGE. Though rare among horses and cattle, tapeworms are common in dogs and sheep, causing irritability of the bowels and an unthrifty appearance. For dogs, no other remedy is equal to powdered areca-nut, of which 30 grains suffice for a dog weighing about 20 lbs. It is best given after 10 or 12 hours' fasting, in a little soup or milk; and should be followed in a few hours by a dose of castor-oil. Neither areca-nut nor any of the approved remedies used in man proves effectual in sheep; and one of the best prescriptions for them consists of 40 drops of oil of turpentine, a dram of powdered green vitriol, and an ounce of common salt, given mixed in a little milk or gruel, or, where their bowels are confined, in linseed-oil. A daily allowance of linseed-cake and sound dry food should likewise be given with the grass or roots, and pieces of rock-salt left within the animal's reach.

TAPIOCA, n. *tăp'ĭ-ō'kă* [Brazil. *tipioka*, the juice of the manioc root when pressed]: farinaceous starchy substance, in the form of coarse grains, obtained from the cassava or manioc plant, the *Janipha manihot*, or bitter cassava, ord. *Euphorbiăceæ*, native of Brazil—*cassava* or *manioc* is prepared from the same, but is more finely granular: see MANIOC, or CASSAVA.

TAPIR, n. *tā'pĕr* [Brazil. *tapy'ra*, a tapir], (*Tapirus*): genus of *Pachydermata*, of section *Ordinaria;* having a bulky form, with moderately long legs; fore-feet four-toed, hind feet three-toed; skin thick, hair short; tail very small; the neck thick; ears short; eyes small; muzzle elongated; nose prolonged into a short, flexible proboscis, which, however, does not terminate in an organ of touch and prehension like that of the elephant; six incisors, two canine teeth, and 14 molars in each jaw, the molars separated from the canine teeth by a wide interval. The best-known species is the AMERICAN T. (*T. Americanus*), about the size of a small ass, and common in almost all parts of S. America, its range extending as far s. as the Strait of Magellan, though it suddenly ceases to be found at the Isthmus of Darien. Its color is uniform deep brown, but the young are beautifully marked with yellowish fawn-colored stripes and spots. The skin of the neck forms a thick rounded

crest on the nape, with a short mane of stiff hair. The T inhabits deep recesses of the forest, and delights in plunging and swimming in water. It feeds chiefly on young shoots of trees, fruits, and other vegetable substances; but is ready to swallow almost anything. Pieces of wood, clay, and pebbles are often found in its stomach. It sometimes commits great ravages in cultivated grounds; a large herd of tapirs, sallying forth from the forest by night, trampling and devouring all that they find in the fields. The T. is a very powerful animal, and, protected by its thick hide, forces its way through the forest where almost no other quadruped can. When assailed by the jaguar, it seeks riddance by rushing through thick underwood, and if it can reach water, is often successful by plunging in

Malayan Tapir (*Tapirus Malayanus*) and Young.

and diving. It is inoffensive, never attacking man; but when hard pressed by dogs, makes violent resistance, and inflicts severe bites. It is very easily tamed, and becomes extremely familiar; but its large size makes it a troublesome pet. Its hide is useful, and its flesh is eaten, though rather dry.—The MALAYAN T. (*T. Malayanus* or *Indicus*) is found in Malacca, Sumatra, etc. It is larger than the American T., and its proboscis is rather longer in proportion. The neck has no mane. The color is glossy black, except the back, rump, and sides of the belly, which are white. The colors do not pass gradually one into another, but the line of separation is marked, giving the animal a peculiar appearance. The habits of this species are similar to those of the American T., and it is equally capable of domestication. The young are striped and spotted as in that species.—A third species is found in mountainous parts of S. America.

The remains of tapirs have been found in Miocene and subsequent strata. In all, about 12 species have been determined. Tapir-like animals are common in Eocene beds. Ten species of *Palæotherium* (q.v.) have been described. *Lophiodon*, of which 15 species have been observed, differs from *Palæotherium* in the structure of the teeth of the lower jaw; and from other peculiarities in the same organs.

Coryphodon (containing three species) has been separated from both genera.

The T. is a remarkable exception to the generalization deduced from comparison of the later Tertiary mammals with those living in the same districts at the present day—viz., that there is a close correspondence between the fauna of the two periods. The Pliocene and Post-pliocene bears, hyenas, tigers, elephants, etc., of Europe and Asia are represented by living species of the same or nearly allied genera. The recent sloths, armadillos, and prehensile-tailed monkeys of S. America were preceded by closely related forms in the later Tertiary period; as were also the marsupials of Australia. Several species of T, have been found in Europe, but they have left no representatives nearer than e. Asia and S. America.

TAPIS, n. *tâ-pē'* [F. *tapis*, a carpet (see TAPESTRY: comp. Gael. *tap*, tow or wool on the distaff]: tapestry; a carpet; a table-cloth. ON THE TAPIS, *tâ-pē'*, on the carpet or cover of the council-table; under discussion or consideration: see CARD 1.

TAPPAN, *tăp'an*, ARTHUR: philanthropist: 1786, May 22—1865, July 23; b. Northampton, Mass.; nephew of David T., D.D. (1752–1803), who was Hollis prof. of divinity at Harvard. After experience in business at Baltimore and at Portland, Me., he became a prosperous dry-goods importer in New York, with his brother Lewis. He gave largely to benevolent societies, and to Oberlin, and to Lane and Auburn theol. seminaries; founded the *Journal of Commerce* 1828; the *Emancipator* 1833; the New York Anti-Slavery Soc. 1833; and was pres. of the Amer. Anti-Slavery Soc., to which he gave many thousands of dollars; and so prominent was he as an abolitionist that he was honored by mobbing, and by a heavy reward offered for his abduction. He was conspicuous in aiding the slave-ship mutineer Martin Cinque, who with his companions was educated with reference to founding the Mendi mission in Africa; also in befriending Garrison when imprisoned in Baltimore. The financial disasters of 1837 led to his bankruptcy, after which he became interested in the first 'mercantile agency,' established by his brother Lewis. He died in New Haven, Conn., and his name is perpetuated in educational halls and professorships named from him as founder, as well as in the history of a great moral contest.

TAPPAN, HENRY PHILIP, D.D., LL.D.: educator and psychologist: 1805, Apr. 23—1881, Nov. 15; b. Rhinebeck, N. Y. He graduated at Union Coll. 1825, and Auburn Theol. Seminary 1827; was pastor of a Dutch Ref. church in Schenectady, N. Y., and of a Congl. church in Pittsfield, Mass.; prof. of moral philos. in New York Univ. 1832–38; conducted a select school; and was chancellor of Michigan Univ. 1852–63, after which he was in Europe. He died in Switzerland. He was honored by membership in foreign learned societies, and was prominent in Amer. educational movements, studying carefully the higher education abroad. The following volumes were published by him: *Review of Edwards on the Freedom of the Will* (1839); *The*

Doctrine of the Will determined by an Appeal to Conscience (1840); *The Doctrine of the Will applied to Moral Agency and Responsibility* (1841); *Elements of Logic* (1844); *Treatise on University Education* (1851); *A Step from the New World to the Old, and Back Again* (1852); *Introduction to Illustrious Personages of the Nineteenth Century* (1853).

TAP'PAN, Lewis: philanthropist: 1788, May 23—1873, June 21; b. Northampton, Mass.; brother of Arthur T. Before he united in forming the firm of Arthur Tappan & Co., New York, he was engaged in manufacturing in New England. He participated with his brother in founding the *Journal of Commerce* and other enterprises; and was alike eminent in the anti-slavery movement, suffering personal violence for his zeal, and in 1834 an attack by a mob on his house, with destruction of its contents. Besides originating the first mercantile agency in New York, he led in founding the Amer. Missionary Assoc., of which he was president. He was prominent in establishing and supporting Plymouth Church, Brooklyn. A life of his brother Arthur was published by him. He died in Brooklyn.

TAP'PAN BAY, or Tap'pan Sea (Dutch *Tappaan Zee*): a widening of the Hudson river between Rockland and Westchester cos., N. Y.; 24 m. n. of New York. It is 12 m. long, from Teller's Point on the n. to Piermont on the s.; and 4 m. wide at its widest point.

TAPPET, n. *tăp'pĕt* [from *tap*, a gentle blow]: in *mech.*, a small lever or projection intended to *tap* or touch lightly something else with a view to change or regulate motion.

TAP'PING, in Surgery: operation performed most frequently on the abdomen, but occasionally on the chest and head. T. of the abdomen gives great relief when the abdomen becomes inconveniently distended with fluid contained in the peritoneal sac, or (in the case of a woman) in an ovarian cyst. A small incision is made about two inches below the navel, through which the cutting surfaces of the trochar—the instrument (like a long needle with a fine tube) used in this operation—are passed: through this instrument the fluid escapes. The wound made by the trochar in the abdomen, in ordinary cases, heals in a few days.

T. of the chest is occasionally required for relief of empyema and other effusions in the cavity of the pleura. T. of the head has been occasionally found successful in hydrocephalus. T. of the pericardium has been tried in cases of pericardial dropsy, but it is an operation not to be recommended under any circumstances.

TAP-ROOT, TAPSTER: see under Tap 2.

TAPTI, *tăp'tē*: river of the Brit. presidency of Bombay, India; rising in the Saugur and Nerbuddah territories, lat. about 21° 46′ n., flowing w. through Scindhia's dominions and the districts of Candeish and Surat to its mouth in the Gulf of Cambay, 17 m. below the town of Surat. It is 441 m. in length, but is hardly navigable; as small vessels of 40 to 50 tons cannot ascend higher than Surat.

TAPU, *tä-po :* see TABOO.

TAR, n. *târ* [AS. *teoru;* Icel. *tjara;* Ger. *theer;* Gael. *tearr*, tar]: thick, impure, resinous substance, of blackish color, obtained from pine and fir trees, and from common coal (see below): familiar name for a sailor—so called from the tar or its odor adhering to his hands and clothing: V. to smear or daub with tar. TAR RING, imp. TARRED, pp. *târd.* TARRY, a. *târ'ri*, consisting of or like tar. COAL-TAR, a viscid fluid found in the pipes during the distillation of gas from coal. MINERAL-TAR, a variety of bitumen found oozing from rocks of different formations. TARRED WITH THE SAME STICK, all alike to blame, or disreputable, as if daubed with tar; having the same bad characteristics. TARRED AND FEATHERED, descriptive of a violent punishment or outrage by a mob—consisting in first covering the victim with tar, and afterward shaking feathers over him, which adhere tenaciously.

TAR, v. *târ* [O. Dut. *tergen;* Ger. *zergen;* Low Ger. *targen* or *tarren*, to irritate, to provoke: Dan. *tærge*, to tease]: in *OE.*, to set on; to provoke; to tease. TAR'RING, imp. TARRED, pp. *târd.*

TAR: one of the products of destructive distillation of organic bodies: it is derived from all three kingdoms of nature. In various parts of the world, it occurs as a natural mineral product, known as bitumen, asphalt, petroleum, natural tar: see NAPHTHA: PETROLEUM: ETC. As an animal product, a species of tar is obtained from destructive distillation of bones used in preparing bone-black. The distillate, which has a most offensive odor, separates into a heavier layer of black animal tar—commonly known as *bone-oil*, or *Dippel's Animal Oil*—and a lighter layer of watery solution of sesquicarbonate of ammonia—commonly known as *bone-liquor*, and much employed in preparation of various salts of ammonia. This animal tar is used chiefly for lubrication of machinery.

The vegetable kingdom is the most important source of tar. On submitting wood to destructive distillation in closed vessels, we obtain a large number of products (see WOOD, DISTILLATION OF); some are gaseous and some liquid, and of the latter one portion is soluble and the other insoluble in water. This insoluble portion constitutes wood-tar, and is composed of a mixture of various liquids holding solid matters in solution or in suspension. Among its most important constituents are several forms of hydrocarbon; e.g., phenol, C_6H_5OH; cresol, $(C_6H_4.CH_3)OH$; phlorol $(C_6H_4.OH)C_2H_5$; pyrocatechine, $(C_6H_4)OH_2$; and many other bodies not yet determined. The *Archangel T.*, the *Stockholm T.*, widely used in ship-building, and the excellent *American T.* are chiefly prepared from the resinous wood of the pine, especially of the root. The specific gravity of ordinary tar is about 1·040. Peat yields a tar very similar to wood-tar. Coal yields, on distillation in closed vessels, even a larger number of products of distillation than wood. In addition to numerous gaseous products, the liquid portions contain water and various forms of hydrocarbon, which collectively form the liquid known as *coal-*

naphtha; besides which there is a large quantity of dark viscous matter known as *coal-tar.* For the mixture of naphtha and tar, see GAS-TAR. For the beautiful *coal-tar colors* or aniline dyes, see ANILINE: DYE-STUFFS: PHENYL. The distillation of coal-tar is a separate branch of trade. The substance itself is an extremely complex mixture of hydrocarbons, phenols, and nitrogenous bases with various sulphur compounds. Of the substances contained in it, some are basic, and some acid, but the principal portion are neutral or indifferent bodies. The bases include ammonia, aniline, picoline, quinoline, and pyridine. Among the acids, the acetic is present in small amount; but the most important is phenic or carbolic acid. Two other acids, *rosolic* and *brunolic*, exist in coal-T. The neutral substances contain several hydrocarbons, including benzol, toluol, cumol, and cymol, which are among the liquid constituents; while napthalin, anthracene, chrysene, and pyrene are among those which are solid at ordinary temperature (see *Miller's Organic Chemistry*). When wood-tar or coal-tar is submitted to distillation, the solid brown or black residue left in the retort constitutes *pitch.*

Wood-tar, under the title *Pix liquida*, is included in the Pharmacopœia, in which its characters are given as follows: 'Thick, viscid, brownish black, of well-known peculiar aromatic odor. Water agitated with it acquires a pale-brown color, sharp empyreumatic taste, and acid reaction.' Tar was used in medicine in former times more than at present. Bp. Berkeley's commendatory essay on the use of tar-water in diseases of the chest and kidneys, is well-known (see Chambers's *Book of Days*, I. 108). Since his time the inhalation of tar-vapor has been highly recommended in phthisis; and tar-capsules are still occasionally prescribed for relaxed mucous membrane. In the present day, however, tar is seldom used except as a local stimulant in chronic cutaneous diseases.

In modern commerce, there are two kinds of wood-tar —that made in n. Europe from the wood of *Pinus Sylvestris;* and the N. Amer., from *Pinus rigida, P. tæda, P. Australis*, etc. The distillation is usually performed in a very rude manner: a funnel-shaped hole is dug in a bank, about 6 or 8 ft. in diameter at the upper part, and not more than 18 inches at the lower. At the bottom of the hole is placed an iron pan, having a long spout or pipe, which is made to pass through the bank; the hole is then filled up with billets cut from the roots and branches of the pine-trees, which, after being kindled at the top, are covered over incompletely with turf. The wood is thus charred from above downward; and the tar, mixed with various other products, flows off at the bottom through the spout into a receiver. A somewhat similar product is obtained in distillation of coal for gas, and in distillation of bones for animal charcoal. Formerly, the chief value of these materials was as a preservative coating for exposed wood-work, ships' sails, ropes, etc., in consequence of their very highly antiseptic properties. A better knowledge of their chemical history has increased their value.

TARA, *tâ'râ*, or TA'RO, *-rō* (*Colocasia macrorhiza*): plant of nat. order *Araceæ*, of the same genus with the Cocco (q.v.), or Eddoes, and cultivated for its roots, a principal food in the South Sea Islands. The roots are 12 to 16 inches long and as much in girth. They are washed to take away their acridity, which is such as to cause excoriation of the mouth and palate. They are cooked in the same way as bread-fruit, the rind being first scraped off A pleasant flour is made of Tara. Many varieties are cultivated. The plant has no stalk; broad, heart-shaped leaves spring from the root; and the flower is produced in a spathe. The leaves are used as spinach.

TA'RA FERN (*Pteris esculenta*): species of Brake (q.v.) the root (rhizome) of which was one of the principal articles of food of the New Zealanders, before the settlement of New Zealand by British colonists. This fern comes to perfection only in good soils, and there the plant is 10 ft. high. Plants three years old furnish the best roots, about an inch in circumference. The root, being dug up, is cut in pieces about 9 inches long, and placed in stacks, carefully protected from rain; it is the better for being a year above ground. For use, it is steeped in water, dried in the sun, and then roasted. A large quantity of a pleasant flour is obtained from it by beating on a stone.

TARANAKI, *tâ-râ-nâ'kē:* provincial dist. of New Zealand, occupying the s.w. corner of the n. island; 2,137,000 acres, three-fourths dense forest. The coast is lined with iron-sand. The soil and climate are good for rearing cattle, horses, and sheep. Cap. New Plymouth; pop. (1890) 3,350.—Pop. of T. (1881) 14,858; (1901) 37,885.

TARANTELLA, n. *ta-răn-tĕl'tâ* [It.]: rapid Neapolitan dance in six-eight measure; so called because it was popularly thought to be a remedy against the supposed poisonous bite of the tarantula spider, which was said to set people dancing: also the music suited for the dance.

TARANTISM, *tăr'ant-ĭzm*, or TARENTISM [from It. *Tarento:* see TARANTULA]: a leaping or dancing mania, supposed to originate in an animal poison. The name is from that of the wolf-spider of s. Italy, *Tarantula* (q.v.); and the nervous affection was formerly believed to be produced by the Tarantula's bite. The gesticulations, contortions, and cries somewhat resembled those observed in St. Vitus's Dance, and other epidemic nervous diseases of the middle ages, with which T. was contemporaneous; but the affection differed from these in its origin, in the cachexia present, in the elegance of the movements of the victims, in their partiality for red colors, bright and luminous surfaces, their passion for music, and in their restoration depending on the use of instrumental or vocal music as a remedy. Although the sufferers were subjected to extraordinary treatment, such as being buried up to the neck in earth, the curative effect of music was generally recognized. The class of tunes called *Tarantella* or *Tarentella*, recall the epidemic dancing mania of the middle ages. T. was most prevalent in Apulia, hence the former

specific name of the tarantula, *Tarantula Apuliæ*. Whatever share in the disorder the bite may have had, it is unquestionable that the sufferers were afflicted with some not then recognized nervous malady. The symptoms are plainly those of hypochondriacal and hysterical affections. Modern experiments do not confirm the mediæval belief that T. is produced by the bite of the Tarantula: see TARANTULA. The whole history of the dancing mania is given in Hecker's *Epidemics of the Middle Ages*.

TARANTO, *tȧ'rân-tō* (anc. *Tarentum*): town of s. Italy, province of Lecce, on a rocky islet, formerly an isthmus between the Mare Piccolo (Little Sea), an extensive harbor on the e. or landward side of the town, and the Mare Grande (Great Sea), or Gulf of Taranto, on the w. The natural channel between the two 'seas' has been spanned by a long bridge of seven arches, rendering the Mare Piccolo quite useless as a harbor, and forcing ships to anchor in the outer roads, exposed to s. and s.w. winds. The principal buildings are a cathedral dedicated to St. Cataldo, native of Raphoe in Ireland, who was first bishop of T.; a fine episcopal palace; a castle and fortifications erected by Charles V., and commanding both seas; and two hospitals. The streets are as narrow and dark as those of an oriental city. T. has manufactures of velvets, linens, and cottons, but little commerce. The Mare Piccolo, however, is still famous (as of yore) for immense abundance of shell-fish, and a considerable portion of the population is supported by the oyster and mussel fisheries. Pop. (1881) 26,611.

Ancient Tarentum was far more famous and splendid than its modern representative. Founded by a body of Spartan emigrants about B.C. 708, it prospered for centuries in happy obscurity. Its territory was not very fertile, but its pasturage was of the finest, and its olive groves were unsurpassed. It attained rank as the chief city of Magna Græcia through the excellence of its harbor (the Mare Piccolo), ample and secure beyond all other harbors of Lower Italy. Gradually it became the chief emporium of the Græco-Italian trade, and long after all the rest of the colonial cities in Magna Græcia had fallen into decay, Tarentum was 'blooming alone' in undiminished prosperity. In B.C. 4th c., it had for its *strategos*, or general (seven times), the philosopher and geometer Archytas, under whom it became the headquarters of the Pythagorean sect, and was honored with a visit from Plato, who was the guest of Archytas during his residence there. But at the acme of its greatness, it provoked a quarrel with Rome (q.v.), B.C. 281, in which, though aided by Pyrrhus (q.v.), King of Epirus, it was utterly crushed, after a struggle of less than ten years; and though its natural advantages prevented its sinking into such insignificance as other cities of Magna Græcia, it was never afterward a place of importance. Under the empire, it was quite overshadowed by Brundusium, on the Adriatic, but rose again during the Gothic wars, and passed into the hands of the Saracens and Greeks, from the latter of whom it was wrested by Robert Guiscard, the Norman, 1063. Since then, it has shared the

fortunes of the kingdom of Naples. Few relics of the classic Tarentum are extant, the chief being bits of an amphitheatre, a circus, and traces of some of the temples.

TARANTULA, n. *tăr-ăn'tū-lă*, or TARENTULA, n. *tăr-ĕn'tū-lă* [It. *tarantola*—It. dim. from L. *Tarentum* (now *Taranto*), town in s. Italy where it is said to be specially common]: species of wolf-spider found in warmer parts of Italy and s. Europe, whose bite has been said to produce an uncontrollable impulse to dance. The name is given also to a violent Italian dance, and to the music to which it is danced.

The tarantula of southern Europe (*Lycosa tarantula*) belongs to the mining section of the family *Lycosidæ*, or wolf-spiders. It is about ¾ in. long, and is covered all over its body with an ochreous down. It is found usually is dry situations thinly covered with vegetation and fully exposed to the sun's rays. It lives in an underground passage which it excavates for itself and lines with its web. The passage is tubiform, an inch in diameter, and descends for a few inches, then bends at an obtuse angle, and becomes vertical again near the closed end. The tarantula takes its position at the first bend, where it lies in wait for its prey. Sometimes the tube is continued above ground, the tarantula constructing, of earth and bits of wood, a small funnel, which it lines with web as it does the subterranean tunnel. From a study, by Dr. Zangrelli, of the tarantula and its habits and of the effects of its bite, it appears that the first pathognomic symptom following the bite is a numbness at the part bitten: after some hours there are slight convulsive shiverings, cramps of the muscles, and spasm of the throat, followed by vomiting and a 3 days' fever. As a rule, recovery follows after a copious perspiration. A fatal result is exceedingly rare, but Dr. Zangrelli records one case in which tetanus was followed by death on the 4th day. The female tarantula lays about 1,000 eggs in a season: she cares for her offspring until they are able to care for themselves. See TARANTISM.—The name tarantula is commonly given in America to any large hairy spider, as the bird-spider, crab-spider, and to all spiders of the family *Mygalidæ* (see MYGALE). A genus of spider-like scorpions also bears the name.

TARAPACA, *tâ-râ-pâ-kâ'*: Chile: a province in the northern part of the country, between Bolivia and the Pacific Ocean. Area, 19,300 square miles. The main range of the Andes forms the eastern boundary, while a lower range runs along the coast. The entire intervening country is a rainless desert traversed by a few streams in narrow valleys. The importance of the province lies in its immense deposits of saltpetre. These are found in the interior deserts, and railroads are built from the coast to reach them. There are also some silver mines in the coast range. The capital and chief port is Iquique.

The province was occupied by Chilean troops in 1879, and was ceded to Chile by Peru by the treaty of peace in 1883.

TARAXACIN, n. *tăr-ăks'ă-sĭn* [Per. *tarashaqún*, dandelion or wild succory]: a bitter crystalline principle obtained from the dandelion. TARAXACUM, n. *tăr-ăks'ă-kŭm*, genus of plants comprising the *Dandelion* (q.v.). *Taraxacum* or *Dandelion Root* is used in medicine. The roots should be gathered in Aug. and Sep., when the juice is most abundant. There is no very satisfactory analysis of this juice; but it is said to contain mannite, resin, sugar, gum, caoutchouc, and a crystallizable matter termed *taraxacin*, on which probably its active properties depend. In extract, decoction, or juice, it may be given with advantage in chronic diseases of the liver, and in some forms of dyspepsia and skin-disease accompanied by derangement of the biliary organs. In very large doses, it has diuretic and slightly aperient action.

TARAXIS, n. *ta-răks'ĭs* [Gr. *tarassō, taraxō*, I confound]: slight inflammation of the eye.

TARAZONA, *tâ-râ-thō'nâ:* town of Spain, province of Zaragoza, 52 m. w.n.w. of the city of Zaragoza, on the Queyles, a tributary of the Ebro. It stands on a plain, exposed to bleak winds from the Sierra de Moncayo on the s., and from the Pyrenees on the n. It is the see of a bishop; and contains a cathedral with slender brisk spire and rich interior, a bishop's palace, and a Moorish *Alcazar*. Pop. more than 8,000, mainly agricultural.

TARBELL, IDA MINERVA: American biographer: b. Erie county, Pennsylvania, 1857, Nov. 5. She was graduated from Allegheny College, Meadville, Pa.; was associate editor of *The Chautauquan* 1883-91; studied at the Sorbonne and College de France, 1891-4; and since 1894 has been on the editorial staff of *McClure's Magazine*. Her publications include a *Short Life of Napoleon Bonaparte* (1895); *Life of Madame Roland* (1896); *Early Life of Abraham Lincoln* (with J. M. Davis, 1896); *Life of Abraham Lincoln* (1900); *History of the Standard Oil Company* (1904).

TARBES, *târb:* town in s. France, capital of the department Hautes-Pyrénées; on the left bank of the Adour, 23 m. e.s.e. of Pau. It is a station on the *Chemin de fer du Midi*, and the centre of communication with all parts of the Pyrenees, whose lofty line bounds the prospect on the south. The modern cathedral is the only notable building. There is here a *haras*, or govt. stud, for improvement of the breed of horses. Tarbes has active general trade. Pop. 30,000.

Tarbes dates from the time of the Romans; and its bishopric was founded 420.

TARBOOSH, or TARBUSCH, n. *târ-bôsh'* [Ar.]: red woolen skull-cap, usually ornamented with a blue-silk tassel—worn by Egyptians, Turks, and Arabs; a fez.

TARDIGRA'DA: see SLOTH.

TARDIGRADE, n. *tär'dĭ-grād* [L. *tardus*, slow; *gradus*, a step]: a term applied to an order or class of Arachnida, often called bear-animalcules, water-bears; also formerly applied to the sloths among mammals: ADJ. slow-paced.

TARDINESS, TARDILY: see under TARDY.

TARDO, ad. *tär'dō* [It.—from L. *tardus*, slow]: in *music*, slowly.

TARDY, a. *tär'dĭ* [L. *tardus*, slow; Sp. and It. *tardo*; F. *tardif*, slow]: slow in motion; sluggish; backward; reluctant; late; in *OE.*, unwary, criminal: V. in *OE.*, to delay; to hinder. TAR'DYING, imp. TAR'DIED, pp. *-dĭd*. TAR'DILY, ad *-lĭ*, slowly. TAR'DINESS, n. *-nĕs*, slowness of motion or pace; reluctance; lateness.—SYN. of 'tardy, a.': slow; sluggish; unwilling; dilatory; late; tedious.

TARE, n. *tär* [F. *tare*, waste or impairment of merchandise—from Sp. *tara*, tare—from Ar. *taraha*, to reject, to deduct]: formerly, among merchants, an allowance, usually of 4 lbs. to every 100 lbs., for the weight of a package, i.e., of a box, cask, wrapping, etc., containing goods: V. to ascertain the allowance for the weight of the package. TAR'ING, imp. TARED, pp. *tärd*. TARE AND TRET, in *arith.*, rule for calculating amount of allowance for tare, tret, cloff, etc. (see TRET). *Note.*—All these modes of allowance have passed out of use.

TARE, n. *tär* [OE. *tare*, eager, brisk: AS. *teran*, to tear], (*Ervum*): genus of plants of nat. order *Leguminosæ*, sub-order *Papilionaceæ*, distinguished from *Vicia* (see VETCH), to which it is nearly allied, by a capitate stigma, downy all over. It contains only a few species of weak climbing plants, natives of temperate parts of the eastern hemisphere. One of these is the LENTIL (q.v.).—Two (*E. hirsutum* and *E. tetraspermum*), generally known by the name of TARE, have very small flowers and pods; the leaves are pinnate, and the leaflets small. They afford nourishing food for cattle, but the quantity is so small that they are not worthy of cultivation, and are chiefly known as a nuisance in corn-fields. A species of T. (*E. sativum*), with an upright branching habit, is cultivated in parts of Europe for its herbage, as food for cattle, though the bulk of herbage is small. The leaves have 8 to 14 pairs of leaflets. The plant thrives well in poor sandy soils.—It is not supposed that the *Tare* of the New Testament has any affinity to these plants: it is doubtful what it is, but it probably is the DARNEL (q.v.).

TARENTULA: see TARANTULA.

TARENTUM, *ta-rĕn'tŭm*: borough in Allegheny co., Penn.; on Allegheny river, and the Pennsylvania and the Allegheny Valley railroads; 20 m. n.e. of Pittsburgh. It is in an agricultural region; has several natural-gas wells; and contains 5 churches, graded schools, 1 national bank (cap. $50,000); also a glass factory, 2 salt-works, and 2 weekly newspapers. Pop. (1910) 7,414.

TAREN'TUM: ancient town in s. Italy; now TARANTO (q.v.).

TARGET, n. *târ'gĕt* [F. *targe;* It. *targa;* Sp. *tarja;* Gael. *targaid,* a shield: comp. L. *tergus,* skin, hide]: Shield (q.v.) or buckler of a small kind: shield-like object set up as a mark for practice for rifle-shooting, or for artillery (see below). TARGE, n. *târj*, in *OE.* and *poetically,* a shield. TARGETED, pp. *târ'gĕt-ĕd,* furnished or armed with a target. TARGETEER, n. *târ'gĕt-ēr',* one carrying a target.—*Target,* in the modern sense, is the mark for aiming at in practicing with the cannon, rifle, or bow and arrow, etc. Of modern targets, the simplest is that used for Archery (q.v.). For rifle targets, the necessities are: a butt, artificially constructed or cut in the face of a hill, to prevent wide balls from scattering; a marker's shot-proof cell, near the targets; and a range of such length as can be procured.

In the United States, target-ranges for milit. rifle-practice are maintained at a number of regular army posts and by several states. There is an army gunnery school at Fortress Monroe, and a proving ground for heavy ordnance at Sandy Hook. The principal rifle-range in the United States is the one at Creedmoor, Long Island, N. Y., which was provided by the joint action of the National Rifle Assoc., the state of N. Y., and the cities of New York and Brooklyn. Each regt. in the N. Y. militia stationed in the two cities is obliged to practice at the range annually, and in recent years companies of U. S. troops have been sent there for like purpose. The international rifle matches in the United States have been shot there. The range occupies 85 acres of level ground, has 30 targets, which can be used at 50–1,200 yards, and was opened 1873, June 21. The targets are iron slabs, 6 ft. high and 2 ft. wide, and constructed so that several can be bolted together. For ranges 50–300 yards, single targets are used; for 300–500 yards, 3 targets are bolted together (6 x 6 ft.); for 600–1,200 yards and for volley-firing, 6 targets are bolted (6 x 12 ft.). The bull's-eyes are: for 50–300 yards, 8 in. sq. with 2 ft. centres; for 300–500 yards, 2 ft. sq. with 4 ft. centres; for 600–1,200 yards, 3 ft. sq. with 6 ft. centres: and for 400-yard volley-firing, 2 ft. high, bull's-eye extending across the target, with centre 1 ft. above and below bull's-eye; and outer, the remainder of the target.—Shots in the 'outer' make no score.

A 'running-man target' has been devised, which consists of a mill-board figure running on wires, worked by the marker in the butt.

TARGOWITZ, *târ-gō-wĭtz',* or TARGOWICZA: a small town in the govt. Kiev, Russia; scene (1792, May) of a plot by five Polish nobles adverse to the constitution of 1791, May 3 (see POLAND). They were incited to this by Catharine II., and escaped death only by precipitate flight to Russia, where they were munificently rewarded.

TARGUM, n. *târ'gŭm* [Aram. *targum*, interpretation]: one of the ancient translations or paraphrases of portions of the Old Test. in the Aram. language or dialect. TARGUM'IC, a. *-ĭk*, pert. to the literature of the Targums. TAR'GUMIST, n. *-gŭm-ĭst*, the writer of a Targum.—*Targum* is the general term for the Aramaic versions of the Old Test., which became necessary when, after and perhaps during the Babylonian exile, Hebrew began to die out as the popular language, and was supplanted by the Aramaic, for which see SEMITIC LANGUAGES.

The origin of the T. dates from the period of the Second Temple; and although the word in Mishnaic use is employed to denote translations from Hebrew into any other language, the term T. was limited to the Aramaic version of the Old Test. Being both translation and exposition of the text, the T. had its legitimate place with school and liturgy — the reading of text and T. in public worship being traced back to Ezra. There are special rules for reading the T., the official translator being called "targeman," the common pronunciation being "Meturgeman" (compare dragoman). In due course of time the T. was committed to writing and its recital was regarded as a religious duty until, with the decline of the Aramaic as the vernacular, the practice generally ceased, despite the protests of some authorities. The Arabic, in the age of the Geonim (q.v.), had become largely the language of the people, and translations to that tongue was sufficient for popular needs.

The surviving Aramaic versions include all the books of the Old Test., except Daniel, Ezra, and Nehemiah, which in large degree are written in Aramaic. The most characteristic in the T. Onkelos, called also Babylonian T., which was regarded as official and later gained general acceptance in Babylonia. Its name was due to the error of the rabbis in Babylonia who applied to the Aramaic translation of the Pentateuch, the tradition current in Palestine, as to the Greek version of Aquila. Aquila and Onkelos are one and the same person. The designation T. Onkelos was early established and cannot be changed. This T. carefully avoids all authopomorphisms by paraphrases where God might otherwise appear to lose in dignity. It shows marked traces of Babylonian influence in its language, which justify, according to Dr. Bacher, the assumption that the final reduction occurred in Babylonia. Recent researches show that this T. was received by the Babylonian authorities from Palestine, which had furnished them as well with Mishnah (q.v.) the Tosefta, and various Midrashim, and where it had been employed in the second century. It is supposed that the T. of Onkelos and the Palestine T. was originally identical. The second important T. is the Palestine or T. Jerushalmi, long erroneously ascribed to Jonathan ben Uzziel, another of the T. to the Prophets, perhaps due to an incorrect reading of the

abbreviation of initial letters read T. Jonathan, instead of Jerushalmi. The complete Palestinian T. is not earlier than the 7th c. Fragments of the P. T. survive older than the T. ascribed to Jonathan. A third important T. is that of Jonathan to the Prophets, carried from Palestine to Babylonia, where it was recognized in the 3d c. Its origin was liturgical, a reading from the Prophets accompanying the reading of the law. Jonathan ben Uzziel, the reputed author, was an eminent pupil of Hillel (q.v.). There are also a Palestinian T. to the Prophets, and also T., chiefly Palestinian, to the hagiographa, which need not be particularized in the limited space at command. The value of the T. in preserving the knowledge of the Bible and tradition cannot be overestimated, although we can hardly appreciate its work in our days of Bible translations. The bibliography is extended — the general reader can consult J. W. Etheridge's translations of the three Targums to the Pentateuch (London, 1862–65). Many of the most scholarly writers on the T. are Zunz, Frankel, Geiger, Dalman, Nestle, Berliner, Groneman, Emanuel Deutsch, Cornhill, Bacher, Maybaum. Much remains to be done to utilize the T. as an important branch of Aramaic literature. The need of a complete critical edition is felt, and will doubtless be supplied in time. There are translations in parts in Latin, English, German, etc. For exegetical and philological purposes the T. is an exceedingly interesting as well as suggestive branch of study, hardly appreciated at its right value in the interpretation of the Old Testament.

TARIFA, *tâ-rē'fâ:* seaport town of Spain, 21 m. w.s.w. of Gibraltar; the most southern town of Europe. It is surrounded by tower-embattled walls, and communicates by a causeway with a small island, on which stand a fortress and light-house. The town is the most thoroughly Moorish in Andalusia; it is quadrangular in shape, and its streets are narrow and dark. Tunny and anchovy fisheries are actively carried on.— Pop. (1887) 13,206.

T. (the Carthaginian *Josa* and the Roman *Julia Traducta*) received its present name from the Moors, who are said to have called it after Tarif (= Tarik?) Ibn Malik, who landed there to reconnoitre previous to the conquest of the country: see MUZA: RODERIC. It was successfully defended 1811 by 2,500 troops (mostly British) against a French force of 10,000 men under Victor and Laval.

TARIFF, n. *tăr'ĭf* [Turk. *tarif*, an explaining, a describing: Ar. *tarif*, explanation — from *arf*, knowledge: T. *tarif*; Sp. *tarifa;* It. *tariffa*]: table or book of rates or duties to be paid on goods imported or exported; a fixed scale of duties levied by govt. on imports: V. to make a list of duties payable on merchandise. TAR'IFFING, imp. TAR'IFFED, pp. *-ĭft*. *Note.*— Trench, *On the Study of Words*, says that the true origin of TARIFF is from *Tarifa* (q.v.), name of a town and promontory in s. Spain extending into the Straits of Gibraltar, on which was a castle: here, when Spain was in their possession, the Moors levied a fixed

duty on the merchandise in all vessels entering the Mediterranean.—A *Tariff* may be imposed only for revenue, or only for protection against foreign competition, or for a combination of these two purposes in various proportions, or for other purposes.

A PROTECTIVE TARIFF is a schedule of duties laid on imports, for protection of domestic producers against the hurtful competition of foreign producers. A purely protective T. levies duties only on articles of import that are economically produced or producible in the importing country; e.g., in the United States, on foreign-made cutlery. Foreign commodities not economically produced or producible in the importing country are of course not fit subject of a protective T., though nearly always to some extent included in the schedules of tariffs summarily designated as 'protective.' Hence when the schedules of a U. S. tariff law comprise such products as tea, coffee, cocoa nibs, the object of the impost is not protection of domestic tea, coffee, or cocoa culture, but either revenue or some incidental advantage—e.g., the object may be to afford to the govt. of the importing country a ground on which it can, by remitting or by enforcing the T., promote the foreign commerce of its own citizens.—By its very name, a protective T. is distinguishable from a statute of prohibition of foreign importation. The two measures may have an identical end—promoting home production and home industries; but the fundamental difference is that by prohibition an absolute, by protection a restricted, monopoly is assured to the producers and manufacturers of the protected country.—The theory of economic development by protective tariffs is clearly and forcibly expounded by Friedrich List (d. 1846), a German economist who while an exile in America became imbued with Alexander Hamilton's doctrine of protection, and whose writings in turn influenced that great American economic writer Henry C. Carey. List's *Nationales System der Politischen Oekonomie* (6th ed. 1877) has been translated into English (*National System of Political Economy*); it is an authoritative exposition of protectionism, and his exposition of the theory of economic development fairly represents the protectionist argument. His theory postulates three stages of economic evolution; viz., (1) agriculture, (2) agriculture united with manufactures, (3) agriculture, manufactures, and commerce combined. The economic task of the state, according to List, is to bring into existence through legislative and administrative action the conditions required for the progress of the nation through these three stages. Every nation, he holds, should begin with free trade, stimulating and improving its agriculture by intercourse with richer and more cultivated nations, importing foreign manufactures and exporting raw products. But when it is economically so far advanced that it can manufacture for itself, then a system of protection is needed to allow the home industries to develop themselves fully, and to save them from being overpowered in their earlier efforts by the competition of more matured

foreign industries in the home market. When the national industries have grown so strong as to be in no fear of this competition, then the highest stage of progress is reached, and free trade should be the rule. When List wrote, he classified the principal nations according to these three stages of development: this classification (according to his theory) has since been largely changed by economic advance in such nations as Germany, France, and the United States.

Prof. Robert E. Thompson, in stating the argument for a protective T., recognizes the same division of the 'industrial state' into three classes—agricultural, manufacturing, and commercial. If the world were in an ideal state of harmony, the policy of *laissez faire* would, Thompson admits, be the true one for the industrial state—for farmer, manufacturer, and merchant. But the world is far from such harmony; there is a sharp conflict of class interests; and to adjust the balance and give all classes fair and equal opportunity, governmental direction is necessary. 'Buying in the cheapest market, selling in the dearest market,' may, in the un-ideal state, lead to financial ruin. 'The actual world,' says Prof. Thompson, 'is full of inequalities and disadvantages.' Unrestricted trade between nations in all grades of advance of necessity hinders development of industries in those least advanced. Especially is this result seen in new countries, whose settlers bring with them from their former homes many needs that can be met only by provision of many objects of luxury and convenience, while the industries of the new country, requisite to supply these wants, are undeveloped. 'Until such a country has attained a diversified industry, advanced at nearly all points to full equality with that of the most advanced nations,' its manufacturing class must be protected against the competition of outside manufacturers.

In Great Britian, the model free-trade country, the present T. subjects about 20 kinds of merchandise to an import duty, and none to an export duty.

In the United States, the first T. law enacted by congress (1789) was inspired by Alexander Hamilton, and was frankly for 'protection of domestic manufactures.' The duties ranged from 7½ to 10 per cent. (average 8½ per cent.) *ad valorem*—an insignificant burden if viewed from the present development of commercial agencies, but in 1789 it meant a material addition to the already very high transportation charges of that day: indeed the transportation charges alone must have seemed almost prohibitive. Various manufactures that had been largely developed during Jefferson's embargo and the war of 1812 were threatened with extinction after the return of peace, by the influx of British products. Accordingly the T. of 1816 imposed a protective duty of 25 per cent. on woolen and cotton fabrics, and specific duties on iron goods. In 1824, and again 1828, protective tariffs were enacted, imposing an average duty of 37 per cent. and 44 per cent. respectively on the commodities enumerated in the schedules. The protective system was more effectively organized by the T. of 1832

that act provoked the nullification manifesto of the South Carolina convention; and in the political crisis of the democratic party, produced by the disaffection of the non-manufacturing south, congress enacted (1833) a compromise T. scaling down all duties. But a protective T. was again enacted 1842; again, however, the T. of 1846 reduced duties and aimed to eliminate all protective features. The republican party made its first appearance in national politics 1856, and pronounced in favor of internal improvements to be carried on by the general govt.—a policy that logically involved protection, if not in form, at least in effect, for the works were to be paid for out of increased customs revenues. The enormous expenditure of the govt. on account of the secession war necessitated greatly increased taxation both of imports and of sundry domestic products; the Morrill T. of 1861, and other revenue laws enacted during the war, raised the average rates on dutiable articles to nearly 50 per cent. *ad valorem*. This T. legislation was in effect highly protective, and under it domestic manufactures were enormously stimulated. The T. rates were reduced 1883, by 'an act to reduce internal-revenue taxation, and for other purposes;' still the new act was protective.

The T. of 1890 (McKinley Act) was the most thorough and most consistent piece of legislation ever enacted in the United States for protection of home industries, and therefore called forth the most earnest antagonism of those who deem the 'protection' principle fundamentally unjust and unsafe. The 'Administrative Act' of the same congress (52d) reinforces the T. act by further imposts on imported goods; by the Administrative Act 'all cartons, cases, crates, boxes, sacks, and coverings of any kind, and all other costs, charges, and expenses incident to placing the merchandise in condition packed ready for shipment to the United States,' are to be included in estimating the dutiable value of goods subject to *ad valorem* duties.

A platform favoring a tariff for revenue only was adopted by the democratic party in 1892, the principles of which were embodied in the so-called 'Wilson bill,' which provided for the abolishment, within one year, of about 38 per cent. of the duties then being paid, and for placing on the free list manufactures and farm products paying from 50 to 60 per cent. duties. The bill as sent to the senate provided for material reduction on specific duties, and liberally provided for *ad valorem* duties; but the senate's amendments to the bill gave it very much the general character of the act of 1883—a compromise scaling down all duties. The bill became a law in 1894, without Pres. Cleveland's signature. This bill provided for a tax of 2 per cent. on all incomes over $4,000 per annum, the tax being laid on the excess over that amount, and it was estimated that a revenue of $50,000,000 would flow from this source; but in 1895 the supreme court declared the law unconstitutional so far as it provided for a tax on incomes from real estate or from state bonds, and on a rehearing of the case the same court declared the whole law unconstitutional.

TARIFF.

The tariff question formed a conspicuous feature of both the republican and the democratic platforms adopted by the national conventions that respectively nominated candidates for pres. and vice-pres. 1896, the republicans advocating a tariff for both protection and revenue, and the democrats a tariff for revenue only. The republicans having been successful in the election, on the opening of an extra session of congress 1897, Mar. 15, Mr. Dingley, chairman of the committee on ways and means, introduced into the house a new tariff bill embodying the declared principles of the republican party. This bill passed the house July 19, and the senate July 24. The following 'compromise' on sugar-rates, reported by the conferrees of both houses, was adopted:

'Sugars not above No. 16 Dutch standard in color, tank-bottoms, syrups of cane-juice, melada, concentrated melada, concrete and concentrated molasses, testing by the polariscope not above 75°, ninety-five one-hundredths of one cent per pound, and for every additional degree shown by the polariscopic test thirty-five one-thousandths of one cent per pound additional, and fractions of a degree in proportion; and on sugar above No. 16 Dutch standard in color, and on all sugar which has gone through a process of refining, one cent and ninety-five one-hundredths of one cent per pound; molasses testing above 40° and not above 56°, three cents per gallon; testing 56° and above, six cents per gallon; sugar-drainings and sugar-sweepings shall be subject to duty as molasses or sugar, as the case may be, according to polariscopic test.'

An estimate based largely on computations by the chief of the U. S. Bureau of Statistics gave the sum of $176,884,000 as likely to be realized in the first fiscal year of the new tariff operation. Numerous protests were uttered by foreign nations—notably Germany, Italy, and Austria—against the proposed increase of rates and the discriminatory features of the tariff bill. By the end of June, 1897, no fewer than 15 nations had either made formal diplomatic protest against, or had expressed in their legislative assemblies dissatisfaction with, some of the clauses.

International Reciprocity expresses the relation between two (or more) nations, wherein they are pledged to treat each other in the same manner with regard to a similar subject or group of subjects; a reciprocity treaty contemplates equality of commercial privileges between the subjects of the govts. concerned. A reciprocity treaty may be without any other stipulation save that each party shall enjoy the privileges of 'the most favored nation' within the jurisdiction of each other party. The reciprocity section of the U. S. T. law of 1890 provides that 'on and after July 1, 1892, whenever . . . the president shall be satisfied that the govt. of any country producing . . . sugars, molasses, coffee, tea, and hides . . . imposes duties . . . upon the agricultural or other products of the United States which, in view of the free introduction of such sugar, molasses . . . into the United States, he may deem to be reciprocally unequal and unreasonable, . . . it shall be his duty to suspend . . . the pro-

visions of this act relating to the free introduction of such sugar, molasses, . . . the production of such country, for such time as he shall deem just. . . .'—Within a few months after this act, treaties of reciprocity were entered into with several countries. The provisions for reciprocity in the Dingley bill empower the president to suspend a limited number of duties in return for concessions, and to impose others when he deems retaliation necessary to equalize trade conditions. Reciprocal trade treaties negotiated by the president are to be submitted to the senate.

See FREE TRADE; BOUNTY; CORN LAW.; ANTI-CORN-LAW LEAGUE; CUSTOMS DUTIES; POLITICAL ECONOMY.

Among the works to be consulted for exposition of the benefits of protective tariffs are: the writings of Henry C. Carey, and in particular his *Principles of Social Science;* Horace Greeley's *Essays on Political Economy;* Joseph Wharton's *International Industrial Competition;* David H. Mason's *How Western Farmers Are Benefited by Protection;* Robert E. Thompson's *Social Science and National Economy;* the translation of List's work above mentioned, and his *Gesammelte Werke.*

TARIJA, *tâ-rē'hâ,* Bolivia: the capital of the department of the same name, situated among the mountains near the Argentine frontier. It lies on a fertile mountain-plain, and has a pleasant climate. The town has a handsome church, and there is considerable transit trade with Argentina. Pop. about 10,000.

TARIM, *tâ-rēm',* Central Asia: a river of East Turkestan, formed by the confluence of the Aksu, Yarkand, and Khotan-Darya at the southern base of the western Tyan-Shan ranges, 60 miles southeast of Aksu. Thence it flows east and finally southeast, losing itself in the group of lakes and salt marshes known as Lob-nor, at the northern base of the Kuen-Lun range. With its main headstream, the Yarkand, the Tarim River encircles the vast desert plain of Turkestan, receiving nearly all its tributaries from the surrounding mountains on its left bank. The Tarim and its basin were first thoroughly explored and mapped by Hedin, during the last years of the 19th c.

TAR'KINGTON, (NEWTON) BOOTH: American novelist: b. Indiana, 1869, July 29. He was graduated from Princeton in 1893 and his first novel *The Gentleman from Indiana* (1899) attracted widespread and favorable attention. It was followed by *Monsieur Beaucaire* (1900); *The Two Vanrevels* (1902); *Cherry* (1903); *The Beautiful Lady* (1905), etc.

TARKIO COLLEGE: located at Tarkio, Mo. It was established by private initiative in 1883 under the name of Tarkio Valley College and Normal Institute. A new charter was obtained in 1884 by which the name was changed to Tarkio College and the institution came under the control of the United Presbyterian Church.

The college has been from the first coeducational. Its organization includes a collegiate department, a normal department, a preparatory department, a musical department, and a commercial department. The collegiate department offers two courses leading to a degree, the classical (degree of A.B.), and the scientific (B.S.), and a third course, the literary, for the completion of which a diploma is granted; this latter omits one year of the work of the scientific course. The normal course occupies four years; students are allowed to pursue the studies they most need. Students in both this and the commercial department can take additional studies in any of the collegiate courses. Bible study is a part of the curriculum in the preparatory and collegiate courses. The college has a campus of 20 acres a little above the town; the buildings are the main building, Marshall Hall (women's dormitory), and Gentleman's Hall. In 1901 David Rankin gave $53,000 toward the increase of the permanent endowment. The library contains 2,700 volumes; the students number 317, and the faculty 26.

TARLAC, *târ'lâk*, Philippines: (1) Pueblo, capital of the province of Tarlac, Luzon, on the Bolso River at the point where its name changes to Tarlac, and on the Manila & Dagupan railroad; 73 miles north of Manila. In addition to the railroad it has excellent highway facilities, and is the centre of trade for the surrounding country. Pop. 9,670. (2) An interior province in the southwestern part of northern Luzon, bounded on the north by Pangasinán, on the east by Nueva Ecija, on the south by Pampanga, and on the west by Zambales; area 1,295 square miles. In shape it is approximately square, measuring 37 miles from north to south and 39 miles from east to west; the eastern part is level, while the western part includes the eastern slopes of the Cordillera de Cabusetan, the highest peak being Mount Iba, 1,604 feet. The province is watered by numerous rivers. Rice is the most important product; sugar is also raised in large quantities, and tobacco and corn on the higher levels. The forests are valuable, and the timber is easily obtained on account of the numerous rivers, and their proximity to the forest lands. There are a few mechanical industries for domestic use only. The province is traversed by the Manila & Dagupan railroad, the main highway, and numerous lesser roads; the rivers also are navigable for native boats, so that the facilities for trade are excellent. Pop. (1901) 89,339.

TAR'LATAN: a thin and fine species of muslin, mostly used for ladies' ball dress. The chief seat of the manufacture is Tarare, in France.

TARLETON, *târl'ton*, Sir BANASTRE: 1754, Aug. 21—1833, Jan. 23: b. Liverpool: English military officer. He entered the British army as cornet at an early age; accompanied Lord Cornwallis to America 1776, May; and served in subordinate posts till 1779. He then or-

ganized a force of cavalry, infantry, and light artillery, known as 'Tarleton's Legion,' and with the rank of lieutenant-colonel went with Sir Henry Clinton to South Carolina, and carried on a cruel partisan warfare till his force was almost entirely annihilated by Gen. Daniel Morgan (q.v.) in the battle at Cowpens (q.v.) 1781, Jan. 17. After this he was with Cornwallis till the surrender at Yorktown. Returning to England, he was promoted colonel; was member of parliament 1790-1806 and 1807-12; was promoted lieutenant-colonel 1817; and made a baronet 1818.

TARN, n. *târn* [Icel. *tjörn*, a little lake]: a small mountain-lake; a marsh; a bog.

TARN (ancient TARNIS): a river of France, which rises on the south slope of Mount Lozère, near Florac, in the department of Lozère. It flows west-southwest, crosses the departments of Aveyron and Tarn, passing Alby, turns northwest through Haute-Garonne into Tarn-et-Garonne, where it passes Montauban, and shortly after, turning almost due west, passes Moissac, and joins the Garonne on the right about three miles below. Its whole course is 230 miles, of which about 100 miles, beginning at Alby, are navigable.

TARN-ET-GARONNE, *târn-ā-gâ-rōn':* small department in southern France, bounded s.e. by the department of Tarn; 1,435 square miles. The principal river is the Garonne, which flows n.w., and its affluents, the Tarn and Aveyron. The surface is marked by plateaux, about 1,000 feet in average altitude; the highest hills do not rise above 1,600 feet. The climate is healthful and temperate. Cereals are raised in great quantities. Of wine, 11,000,000 gallons are produced. The department is divided into the three arrondissements, Montauban, Castel-Sarrasin, and Moissac. Montauban is the capital. Pop. (1901) 194,458.

TARNISH, v. *târ'nĭsh* [F. *terissant*, tarnishing—from *ternir*, to make dim: OHG. *tarnjan*, to obscure: AS. *dernan*, to conceal]: to diminish the lustre or purity of; to sully; to stain; to soil; to become dull or dim: N. a spot; a stain. TAR'NISHING, imp. TAR'NISHED, pp. *-nĭsht:* ADJ. dulled in brightness by exposure to the air; sullied.

TARNOPOL, *târ-nō'pol:* town of Austria, in Galicia, charmingly situated on the left bank of the Sered, 80 m. e.s.e. of Lemberg. Agriculture employs the great mass of the inhabitants, and the periodical horse-market is the most important in Galicia. Pop. (1900) 30,415.

TARNOW, *târ'nŏv:* town of Austrian Galicia, near the right bank of the Dunajec, a navigable tributary of the Vistula; 49 m. e. of Cracow by the Vienna and Lemberg railway. It is the seat of a Rom. Cath. bishop; contains a theological college, and a beautiful cathedral in which are numerous monuments of marble, surmounted by statues, enriched with *bassi-rilievi*, and rising 60 to

70 ft. Several industries are actively carried on. Pop. 30,000.

TA'RO: a plant. See COCCO.

TARPAN: a local name for the Asiatic wild ass (q.v.).

TARPAULIN, n. *târ-paw'lĭn:* a *tarred pall* or covering; a sheet of coarse linen or hempen cloth, saturated with tar to render it waterproof: used for covering loaded wagons, hatchways of ships, etc. Also a sailor's waterproof hat; *familiarly,* a sailor; written also TARPAU'LING or TARPAW'LING.

TARPEIAN, a. *târ-pē'ăn* or *-pē'ĭ-ăn:* named after Tarpeia, daughter of Sp. Tarpeius, gov. of the Roman citadel on the Capitoline, who, covetous of the golden ornaments on the Sabine soldiery, and tempted by their offer to give her what they wore on their left arms, opened a gate of the fortress to Titus Tatius, who had come to revenge the rape of the Sabine women. 'Keeping their promise to the ear,' the Sabines crushed Tarpeia to death beneath their shields, and she was buried in the part of the hill which bears her name. TARPEIAN ROCK (L. *Rupes Tarpeia,* or *Mons Tarpeius*), originally, the whole of the Capitoline Hill at Rome (see CAPITOL): later the name was confined to that part of the hill in which Tarpeia was buried, and from whose rocky brow persons convicted of treason to the state were hurled.

TARPON, *târ'pŏn,* or TAR'PUM, *-pŭm:* the gigantic Silver-fish (*Megalops thrissoides*); best known by its huge, circular, silvery scales, 2½ inches diam., distributed as curiosities or used in fancy-work, and brought usually from Fla., though the fish ranges from Cape Cod to Brazil. It attains 5-6 ft. length, and stuffed specimens are in the windows of city restaurants. The tarpon is regarded by anglers as the finest of American game fishes. It is related to the herrings and resembles them in general outline, but is sometimes 6 ft. long. Its special marks are the long filamentous appendage of the posterior margin of the dorsal fin and the huge, round, shining scales, which encase the body in an armor of glittering silver, and make the name 'silver king' peculiarly appropriate for this noble fish. Among the French and Spanish fishermen about the Gulf of Mexico and West Indies it is called *grande ecaillé, sabalo, savalle,* etc.; while tarpium, jewfish, and big-eyed herring are also heard. Its scales, as large as, or larger than, a silver dollar, are extensively used in fabricating ornaments, and the flesh is good to eat; but the fish is principally of interest for the sport it affords to the angler with rod and line, who seek it best by going in a boat, with an experienced man at the oars, among the islands or into the bays of the coast of the Gulf of Mexico, within the Florida reefs or around the shores of Porto Rico, where it spawns. Then may be felt as well as seen the astonishing force and strength which this fish daily puts

forth as he chases the swift and agile fishes upon which he subsists. Having seized the angler's baited hook, a struggle begins which taxes tackle and skill to the utmost. The moment the tarpon feels the steel point in his mouth and finds his progress checked, he leaps high into the air, shaking himself violently in hope of casting off the hook—and he often succeeds. Failing, he leaps again and again; 'with all the frenzy of the wild horse when he first feels the lasso, he springs through the air and dashes through the water.' An hour or more of the most delicate manipulation, and at the same time of severe labor, is often required to subdue a large tarpon, and the achievement is worthy of celebration.

TARQUINIUS PRISCUS, *târ-kwĭn'ĭ-ŭs prĭs'kŭs,* LUCIUS: fifth legendary king of Rome; of date unknown, but previous to B.C. 509 (see ROME); son of Demaratus, a Corinthian noble, who emigrated from Greece and settled at Tarquinii, in Etruria, where he married an Etruscan wife, by whom he had two sons, Aruns and Lucumo. Lucumo married into one of the chief Etruscan families. By advice of his wife, Tanaquil, bold, ambitious, and skilled in augury, Lucumo went to Rome, accompanied by a large train of followers. He was hospitably received and soon admitted to citizenship, whereupon he took the name Lucius Tarquinius Priscus (according to Livy). The Roman king, Ancus Marcius, appointed him guardian of his children; and on the death of the king, Tarquinius Priscus was chosen his successor. His reign was renowned for splendor and success, as the legends recite. Against the Latins, Sabines, and (according to Dionysius) the Etruscans, he warred prosperously, forcing all the 12 sovereign cities of Etruria to do him homage. To him are ascribed the construction of the great *Cloacæ,* or sewers (see, however, CLOACA MAXIMA), which remain uninjured to this day; the laying out of the Circus Maximus and the Forum; the institution of the great or Roman games; and (some say) the building of the Capitoline temple (see CAPITOL). The legend also represents him as effecting certain political and sacerdotal changes: see ROME. Tarquinius was assassinated after a reign of 38 years, at the instigation of the sons of Ancus Marcius, who considered themselves entitled to the throne. But by the dexterity of Tanaquil, his son-in-law, Servius Tullius, was chosen as his successor. He signalized himself by military exploits and by organic changes in the Roman constitution (see ROME for an account of the 'Servian Reform').—Tarquinius left two sons, L. Tarquinius Superbus and Aruns, both of whom married daughters of Servius Tullius; and two daughters, one of whom married Servius Tullius himself, and the other M. Brutus, by whom she became mother of L. Brutus, first consul of the Roman republic. —It should be noted that the annals of the Tarquins, as given by Livy, are largely recitals of mere legends.

TARQUIN'IUS SUPERBUS, *sū-pĕr'bŭs*, LUCIUS: seventh legendary king of Rome; of date unknown, but probably not long previous to B.C. 509; son of Tarquinius Priscus. Having murdered his father-in-law, Servius Tullius, at the instigation of his wife, he is represented in the legend as audaciously usurping the throne; but as his legislative policy was to abolish the reforms of Servius, he doubtless represents a successful reaction of the patricians against the more liberal and progressive policy of the preceding age. That this younger Tarquin, at least, is a historical character seems probable. The incidents of his career are so numerous and coherent, and the impress of his name and character is so deeply stamped on the national memory, that he cannot be regarded as a wholly imaginary personage. As far as we can gather from the ancient annals, it does not appear that all the senators connived at T.'s procedure; for we are told of his banishment of his opponents. He strengthened himself by foreign alliance, marrying his daughter to Octavius Mamilius, Prince of Tusculum. By subtle and unscrupulous intrigues, Tarquin the Proud consolidated the Roman hegemony in Latium; offered sacrifice in the name of all the Latins at the Alban Mount; fused the contingents of the Latins with the Roman legion; and, at the head of the combined forces, subdued the dwellers in the Volscian marshes. On his return he completed the Capitol, which Tarquinius Priscus had begun, and deposited in the vaults the Sibylline books (see SIBYL). But his lavish expenditure necessitated heavy taxes, and discontent grew among both plebs and patricians. The king, having opened war on the Rutuli, was besieging Ardea, and in his camp occurred, between Sextus (Tarquin's son) and Collatinus, the famous dispute about the virtues of their respective wives, which led to the rape of Lucretia by Sextus. The legendary details of this outrage, with its result in Lucretia's stabbing herself, are familiar. The tragedy roused such a storm of indignation that the people of Collatia (where the shameful deed was done) rose in arms and renounced their allegiance to Tarquinius. Brutus carried the news to Rome, and the senate, in anger, deposed the tyrant; finally, the army before Ardea also revolted. T. and his sons fled, and an aristocratic republic was constituted at Rome. Three different attempts were made to restore T. by force: first, by his own Etruscan kinsmen of Tarquinii; second, by Lars Porsena (q.v.) of Clusium; third, by his son-in-law, Octavius Mamilius, 'prince of the Latian name,' all of which, according to the legend, failed; and at length T., utterly baffled, retired to Cumæ, where he died, a wretched and childless old man; for all his sons had met death before him.

TARRAGON, n. *tăr'rā-gŏn* [OF. *targon;* It. *targone;* Sp. *taragona*—from Pers. *tarkhûn*, dragon-wort]: aromatic plant used in pickles and salads, and in the perfuming of vinegar; herb-dragon; the *Artemisia dracun'cŭlus:* see ARTEMISIA.

TARRAGONA, *târ-râ-gō'nâ:* seaport of Spain, cap. of the modern province of T.; on the Mediterranean shore, at the mouth of the Francoli; 60 m. w. of Barcelona. It consists of two portions—the upper (the ancient) and the lower (the modern) towns. The former stands on a hill 720 ft. high, and is girdled with ramparts. The lower town, completely separated from the higher by a line of works, is regular and open, and defended by two forts. The beautiful cathedral, in Gothic and Norman, dating from the middle of the 12th c., is the principal edifice. There is an interesting antiquarian museum. Brandy-distilling and manufacture of wines and olive-oil are the chief industries. Pop. 25,400.

T., called by the Romans *Tarraco*, was founded by the Phœnicians (who called it *Tarchon*, citadel), and afterward became capital of the Roman province of Tarraconensis. Among its Roman antiquities are the remains of an amphitheatre, which has been used as a quarry; a magnificent aqueduct, 96 ft. high and 700 ft. long—still in use; and near the town the Tower of the Scipios, much decayed. T. was taken and cruelly sacked, 1813, June, by the French under Suchet.

TARRED: see under TAR 1.

TARRIANCE: see under TARRY.

TAR RIVER: see PAMLICO RIVER.

TARRY, v. *tăr'rĭ* [F. *tarder*, to delay, to tarry—from L. *tardārĕ*, to delay—from *tardus*, slow]: to continue in a place; stay behind; delay; loiter; linger; wait. TAR'RYING, imp.: N. delay. TAR'RIED, pp. *-rĭd*. TAR'RIER, n. *-rĭ-ĕr*, one who tarries; a species of dog—now spelled *terrier*. TAR'RIANCE, n. *-ăns*, in *OE.* or *poetry*, delay; lateness.

TARRY: see under TAR 1.

TARRYTOWN, *tăr'ĭ-town:* village in Westchester co., N. Y.; on the e. bank of the Tappan Zee (wide portion of the Hudson river), and on the New York Central and Hudson River and the New York and Northern railroads; 26 m. n. of New York. It contains 11 churches, College Hill Seminary, excellent public and private schools, several hotels and summer boarding-houses, many elegant residences of New York business men, a monument commemorating the capture near T. of Maj. John André (q.v.) 1780, 1 national bank (cap. $100,000), 1 savings bank, and 2 weekly newspapers. Near T. are 'Sunnyside,' home and burial-place of Washington Irving; and 'Sleepy Hollow,' the scene of his *Legend;* and the vicinity is immortalized in his *Rip Van Winkle.* Pop. (1880) 3,025; (1890) 3,901; (1900) 4,770; (1910) 5,600.

TARSHISH, *târ'shĭsh:* probably the same as *Tartessus*, which was a city and emporium of the Phœnicians in Spain, somewhere near the mouth of the Guadalquivir. It is frequently mentioned in Scripture in connection with shipping. The name T. may have been applied also to a region in Spain; and some scholars have supposed that there was a port of this name on the Indian Ocean also.

TARSIA-WORK, *târ'sĭ-â-wêrk:* beautiful kind of marquetry made in Italy, by inlaying pieces of colored wood to represent figures and landscapes—usually applied to decorate cabinet-work. That of Sorrento is very celebrated; and many fine pieces have been made in Perugia.

TARSUS, n. *târ'sŭs* [Gr. *tarsos*, the sole of the foot, the edge of the eyelid]: the instep; the cartilage supporting each eyelid; the last segment of the legs of an insect. TAR'SAL, a. *-săl*, pertaining to the instep, or to the cartilage of the eyelid. TAR'SO-MET'ATAR'SUS, n. *târ'sō-*, the single bone in the leg of birds, produced by the union and anchylosis of the lower or distal portion of the tarsus with the whole of the metatarsus: see METATARSUS.

TARSUS, *târ'sŭs:* anciently the chief city of Cilicia, one of the most important in Asia Minor; situated on both sides of the navigable river Cydnus, in a beautiful and productive plain, about 18 m. from the sea. It was a great emporium for traffic between Syria, Egypt, and central Asia Minor. In the time of the Romans, two great roads led from T., one n. across the Taurus by the 'Cilician Gates,' the other east to Antioch by the 'Amanian' and 'Syrian Gates.' T., judging from its name, was probably of Assyrian origin; but the first historical mention of it occurs in the *Anabasis* of Xenophon, where it figures as a wealthy and populous city, ruled by a prince tributary to Persia. A Moslem general estimated from its ruins, about the 7th c., that its former pop. had been 100,000. In the time of Alexander the Great, it was governed by a Persian satrap; it next passed under the dominion of the Seleucidæ, and finally became cap. of the Roman province of Cilicia. At T., Antony received Cleopatra, when, arrayed as Aphrodite, she sailed up the Cydnus with magnificent luxury. Under the early Roman emperors, T. was as renowned for culture as for commerce; Strabo ranked it, in zeal for learning, above even Athens and Alexandria. It was the birthplace of the apostle Paul, who received the greater part of his education here; and here the emperor Julian was buried. Gradually, during the confusions at the decline of the Roman and Byzantine power, it fell into comparative decay; but even yet it is—under the name of *Tarso* or *Tersus*—the most considerable place in s.e. Asia Minor, and exports corn, cotton, wool, copper, gall-nuts, wax, goats' hair, skins, hides, etc.—Pop. about 30,000 (in winter).

TART, a. *târt* [AS. *teart*, sharp]: sour; acid; sharp, keen; severe, as a reply. TART'LY, ad. *-lĭ*, sharply; sourly; with sourness of aspect. TART'NESS, n. *-nĕs*, sharpness to the taste; sharpness of language or manner; sourness; sourness of temper. TART'ISH, n. *-ĭsh*, somewhat tart.—SYN. of 'tartness': sourness; keenness; acrimony; severity; asperity; poignancy; harshness; acerbity; animosity.

TART, n. *târt* [F. *tarte*, *tourte*, a tart, a pie: It. *torta*, a kind of pastry-work: so called from the paste being twisted together—from L. *tortus*, twisted, pp. of *torquērĕ*, to twist]: a small pie consisting of fruit inclosed in pastry and baked. TART'LET, n. a little tart.

TARTAN, n. *târ'tăn* [F. *tiretaine;* Dut. *tireteyn*, linsey-woolsey: comp. Sp. *tiritaña*, a thin woolen cloth, sort of thin silk]: woolen cloth or stuff checkered or striped in various colors and patterns in the weaving, each Highland clan having a different pattern: it is sometimes called 'plaid' (*plăd*). The word tartan is given sometimes to the pattern only, and not to the stuff: ADJ. consisting of or resembling tartan cloth. *Note.*—TARTAN is said by Wedgwood to be unknown in Gaelic. Michel asserts that *tartan* and its manufacture were introduced from France into Scotland probably early in the 15th century.

TARTAN, or TARTANE, n. *târ'tăn* [It. *tartana*—from Ar. *tarrad*, a small swift ship]: a small swift coasting-vessel, having one mast and a very large sail; used in the Mediterranean.

TARTAR, n. *târ'tĕr* [F. *tartre*, tartar—from the alchemist's mid. L. *tar'tărum*, the crust on the sides of wine-vessels]: reddish acid substance which gathers on the sides of casks and vats containing wine, in the form of a hard crust. In its crude form it is called Argal or Argol (q v.), and is a considerable article of export in wine-producing countries. The name is also applied to a white crust which sometimes forms on the teeth (see TARTAR OF THE TEETH). TARTARIC, a. *târ-tăr'ĭk*, of or from tartar; applied to an acid found in tartar, and in the juice of grapes and other fruits (see TARTARIC ACID). TARTARIZE, v. *târ'tĕr-īz*, to impregnate or combine with tartar; to form and deposit tartar, as wines. TAR'TARIZING, imp. TAR'TARIZED, pp. *-īzd:* ADJ. impregnated with tartar. TARTAREOUS, a. *târ-tārĕ-ŭs*, in *bot.*, having a rough crumbling surface. TAR'TAROUS, a. *-tĕr-ŭs*, consisting of or resembling tartar. TARTRALIC ACID, *târ-trăl'ĭk*, peculiar acid into which *Tartaric Acid* (q.v.) is converted by heat. TARTREL'IC ACID, *-trĕl'ĭk*, acid into which *tartralic acid* is converted by heat. TARTRATE, n. *târ'trāt*, a salt of tartaric acid. CREAM OF TARTAR (see TARTARIC ACID). TARTAR EMETIC (see TARTARIC ACID). FOLIATED EARTH OF TARTAR, an old name for acetate of potash, from the foliated satiny masses in which that salt occurs. SOLUBLE TARTAR, term applied by some chemists to neutral tartrate of potash; by others to borotartaric acid: see TARTARIC ACID.

TARTAR, n. *târ'târ* [Pers. *Tátár*, a Tartar]: inhabitant or native of *Tartary* (see TARTARS): one who proves too strong or cunning for his assailant, as in the phrase, 'to catch a Tartar.' TATAR, n. *tä'târ*, though less common, is the better spelling, and the word is so written by modern travellers.

TARTAR, n. *târ'târ* [see TARTAREAN]: in *OE.*, the infernal regions; hell; Tartarus (q.v.).

TARTAREAN, a. *târ-tā'rĕ-ăn*, or TARTA'REOUS, a. *-rĕ-ŭs* [L. *Tar'tărus;* Gr. *Tar'tăros*, the infernal regions]: of, pertaining to, or characteristic of, the infernal regions; hellish: see TARTARUS.

TARTAR'IC ACID: a dibasic acid discovered by Scheele 1769, in argol from wine casks. It is found usually in combination with the juices of many fruits and vegetables, such as the grape, pineapple, mulberry, mountain ash berry, tamarind, cucumber, etc. It occurs in grape juice as the acid potassium tartrate, and is gradually deposited during fermentation, on account of its less solubility in the alcohol produced, on the sides of the vat as a more or less colored hard crust called crude tartar or argol. This, when purified by recrystallization, gives cream of tartar. Tartaric acid is prepared from the tartar, the process, in brief, being as follows: the tartar, after decolorization, is dissolved in water and treated with carbonate of lime; this precipitates the tartaric acid as calcium tartrate; after filtering and washing, this salt is treated with just enough sulphuric acid to form insoluble calcium sulphate and liberate the tartaric acid which passes into solution. The acid is obtained from this liquor and purified by recrystallization. It forms large white, nearily transparent tabular or prismatic crystals very soluble in water. It is intensely sour. Chemical formula $H_2C_4H_4O_6$. Being a dibasic acid it can form acid, normal and double salts. Some of the important ones are potassium acid tartrate $KHC_4H_4O_6$, a white crystalline powder, only slightly soluble in water and known as Cream of Tartar; potassium sodium tartrate (Rochelle Salts) $KNaC_4H_4O_6 4H_2O$, large colorless soluble crystals; a peculiar double tartrate of potassium and antimony $KSbOC_4H_4O_6$, known as Tartar Emetic. Many other salts are known. Free tartaric acid is used to some extent in medicine (Seidlitz Powder) and as a cheap substitute for lemons in some beverages. The salts mentioned above have quite an extensive use; Cream of Tartar in the household, Rochelle Salts as a mild cathartic, and Tartar Emetic as an emetic and in very small doses in various cough mixtures. While there is only one substance properly known as tartaric acid, the chemist applies the name to four different acids: (1) dextro tartaric acid (the ordinary one) that turns the plane of polarized light to the right; (2) lævo-tartaric acid, a laboratory product, that has the opposite effect on polarized light; (3) racemic acid, an acid found with ordinary tartaric acid and that has been shown to be an inactive mixture of equal parts of (1) and (2) into which it can be separated by proper means; (4) meso-tartaric acid, an acid having like (3), no activity toward polarized light, yet which cannot be separated into (1) and (2).

TARTAR OF THE TEETH, *târ'tėr:* deposit of salts of lime and organic matter from the saliva, usually most abundant on the inferior incisors. If allowed to accumulate, it causes inflammation and absorption of the gum, and gradual loosening of the teeth. The accumulation

may usually be prevented if due attention is paid to the cleaning of the teeth. The teeth should be cleaned at least twice a day with a soft tooth-powder (precipitated chalk is best) and a little soap—using a brush with soft bristles not too closely set, which can reach the interstices of the teeth. When the tartar has accumulated to any extent, it must be removed by the *scaling instruments* of the dentist.

TAR'TARS, or TATARS: a nomadic people anciently spoken of as Scythians, known for their incursions and conquests among neighboring nations over a wide extent of territory; their local seat being found both in ancient and modern times in the steppes or uncultivated regions which connect Europe and Asia, as well as on the north of China, in Turkestan, and on the shores of the Caspian and Black Seas. Tartar, Tatar or Ta-ta appears to have been the name of a tribe of Mongols who occupied about the 9th century a district of Chinese Tartary on the Upper Amur. This tribe was dispersed by the attacks of neighboring Mongols, and carrying the terror of its arms in different directions its name came to be applied by the Chinese to various hordes of Mongol robbers. The true Tartars formed part of the horde of Genghis Khan, when that conqueror carried his arms from the country known as Chinese Tartary to Europe, and through some accidental circumstance the name came to be applied to the whole Mongol horde, as well as to the successive hordes of similar origin who followed in their footsteps, and to the districts from which they came, or in which they settled; hence the names of Chinese Tartary, Independent Tartary (see TURKESTAN), and European or Little Tartary, comprising most of the Russian governments of Orenburg, Astrakhan, Ekaterinoslav, the Cossack provinces, and the Crimea. For the incursions and conquests of these peoples see GENGHIS KHAN; MONGOLS; RUSSIA, etc. The name Tartar has, for reasons similar to those already given, been long applied in Europe to the Manchu conquerors of China. The Manchus are Tartars in the generic sense of the term. See MANCHURIA.

TARTARA'GA: a South American trutle of the family *Pelomedusidæ;* specifically the great 'arrau' or river-turtle (*Podoenemis expansa*) of the Amazon basin, the female of which has a shell sometimes measuring 3 ft. in length. This turtle is of great commercial importance throughout northern South America, on account of the eggs, which are periodically collected from the sand banks where they are buried in great quantities, chiefly for the oil to be pressed from them. This is either eaten, like the eggs themselves, or is burned in lamps alone or mixed with tar. The turtles are likewise eaten by man and many animals.

TARTARUS, *târ'ta-rŭs* [Gr. *Tartaros*, a name, probably onomatopœic, the reduplication being designed to express something *terrible* or disagreeable, like *Barbaros, Karkarion*, etc.]: according to Homer, a deep and sunless abyss, as far below Hades (q.v.) as earth is below heaven, and closed in by iron gates. Into T., Zeus hurled those who rebelled against his authority, e.g., Kronos and the Titans. Afterward the name was employed sometimes as synonymous with Hades or the under-world generally, but more frequently to denote the place where the wicked were punished after death—the Lowest Hell. A noticeable feature about these punishments is their congruity with the nature of the offenses perpetrated. See HELL: GEHENNA: also HADES: SHEOL: ETC.

TARTARY, *târ'tâ-rĭ* (properly TA'TARY): name under which, in the middle ages, was comprised the whole central belt of central Asia and e. Europe, from the Sea of Japan to the Dnieper, including Manchuria, Mongolia, Chinese Turkestan, Independent Turkestan, the Kalmuck and Kirghis steppes, and the old khanates of Kasan, Astrakhan, and the Crimea, and even the Cossack countries: hence arose a distinction of T. into European and Asiatic. But latterly the name T. had a much more limited signification, including only that tract bounded n. by Siberia and s. by China and Tibet, with Independent Turkestan; at the present day, many writers use it as a synonym for Turkestan (q.v.).

TARTISH, TARTLY, TARTNESS: see under TART 1.

TARTUFE, or TARTUFFE, n. *târ-tôf'* [after *Tartufe*, chief character in Molière's most celebrated comedy]: a hypocritical devotee. TARTUF'ISH, or TARTUFF'ISH, a. *-ish*, hypocritical.—The name *Tartufe* has become a synonym in all languages for a hypocrite in religion. The original of the character was probably a certain Abbé de Roquette, a parasite of the Prince de Conti. The name is said to have suggested itself to Molière on the occasion of a visit to the papal nuncio, where he saw the pious and solemn countenances of the nuncio's courtiers suddenly lighted up with ecstatic animation by the appearance of a seller of truffles—in Italian, *tartuffoli*. This comedy excited greater commotion than perhaps any other ever did. It was written 1664; but before it was brought on the public stage, partial representations of it in private companies had made its character known, and raised the alarm of the priests, who believed themselves specially satirized therein. Uniting with the many enemies whom Molière had already made for himself by lashing pretentious physicians, fops, and fools of all kinds, they used all means to prevent the public representation of the play. The abp. of Paris threatened with excommunication all actors who should take any part in the performance, and even those who should only read it; and one dignitary went so far as to declare that Molière—whom he called a devil in human form—was deserving of the stake. It was not till 1669 that Molière succeeded in producing the play publicly in pres-

ence of Louis XIV.; and then it had an uninterrupted run for three months, to the great vexation of all hypocrites.

TARUDANT, *tâ-rô-dânt':* town, province of Sus, Morocco; 4 m. from the Sus river, 44 m. from the Atlantic Ocean, near the s. slope of the Atlas Mountains. Within recent years it has been garrisoned and fortified by the sultan, and it is now considered the chief frontier post in the empire. It has several mosques; also dye-works, and leather and copperware factories.—Pop. 30,000—40,000.

TASCHEREAU, *tâsh-rō'*, ELZEAR ALEXANDER, D.D., J.C.D.: Rom. Cath. prelate and cardinal: b. Sainte Marie de la Beauce, Quebec, Can., 1820, Feb. 17. He entered the ecclesiastical seminary, Quebec, 1829, and was ordained priest 1842. He was then for 12 years prof. of philosophy in the Quebec 'little' seminary. He volunteered to carry the comfort of religion to the victims of ship-fever at Quebec 1847, and was himself stricken by the pestilence. He studied canon law in Rome 1854–56, and took the degree *Juris Canonici Doctor*. He then was in succession director of the 'little' and of the 'great' seminary in Quebec, and rector of Laval Univ. He became abp. of Quebec 1871, and 1886 was created cardinal-priest. He died 1898, Apr. 12.

TASHKEND, *tâsh-kĕnd'*, or TASHKENT, *-kĕnt':* formerly a town of Independent Turkestan, but now in the possession of Russia; one of the most important cities of central Asia; in the khanate of Khokan, 92 m. n.n.w. of Khokan, the cap.; on the n. bank of the Saralka, a small feeder of the Djirhik river, an impetuous torrent which empties itself into the Syr-Daria. T. is the chief commercial town in the district, the centre of the transit-trade between Bokhara, Khokan, and Chinese Tartary, and has extensive trading relations with Orenburg and Petropavlovsk. Like most of the cities of central Asia, it stands in a fertile plain. It covers a large tract of ground, being said to extend 10 m. in one direction and 5 in another, and is protected by a high wall of sun-dried bricks. Within the walls are numerous gardens and vinyards; the houses are of mud, and thatched with reeds. The streets are narrow and dirty. The chief buildings are the castle (which is fortified), various mosques, colleges, old temples, and a bazaar. The chief manufactures are gunpowder, silk and cotton goods, and iron. T. is important as a military point, and, mainly for this reason, had been long coveted by Russia. The Russians, who captured it 1854, and retained it for a short time, finally took possession of it 1865, having in the meantime made great advances in central Asia. The petition of the inhabitants that they might be received as Russian subjects was granted 1866; and it has since been governed by a kind of municipal board, the pres. being a Russian officer, and the members chosen by the own people.—Pop. (1897) 156,414.

TASIMETER, n. *tâ-sĭm'ē-tẽr* [Gr. *tasis*, stretching, tension; Eng. *meter*]: in *physics*, instrument, invented by Edison, for measuring very minute variations of pressure, temperature, moisture, etc. It is founded on the discovery of the inventor that carbon, when pressed in the form of a button, affects the electric currents passing through the same, and offers a resistance which diminishes with the pressure. So sensitive is the carbon that, when this pressure varies to the amount of one-millionth part of an inch, the variation in the electric current passing through it will cause a proportional deflection of the galvanometer needle. The tasimeter is an outgrowth of Edison's experiments with that form of telephone with which he sought to vary the intensity of electric waves by means of the human voice. The human finger, held 4 in. from a tasimeter deflects the needle.

TASK, n. *tâsk* [OF. *tasche;* prov. F. *tasque*, a definite amount of work set for one to do—from L. *taxārĕ*, to estimate: the same word as TAX: comp. Gael. *tasg*, a business, a job]: a certain amount of business or labor imposed by another; something to be learned or done, as a school-boy's lesson; burdensome or disagreeable employment: V. to assign a definite amount of employment or labor; to require to do; to burden with employment or labor; in *OE.*, to tax. TASK'ING, imp. TASKED, pp. *tâskt.* TASK'ER, n. *-ẽr*, one who tasks. TO TAKE TO TASK, to reprove; to reprimand. TASKMASTER, one who imposes or assigns oppressive labor to others. TASK-WORK, work imposed or done as a task; work done by the job; piece-work.

TASMAN, ABEL JANSSEN (JANSZEN, JANZOON): Dutch navigator: b. Hoorn, North Holland, about 1602; d. Batavia, Java, 1659. He was engaged in voyages of discovery in the Pacific and Indian oceans in 1639-42 under the patronage of Van Diemen, governor-general of the Dutch West Indies, and in the latter year was sent to circumnavigate Australia. He sailed from Batavia 1642, Aug. 14, discovered on Nov. 24, the island which he called Van Diemen's Land, but which has since been named Tasmania, and later discovered the southern island of New Zealand, the Friendly Islands, and the Fiji Islands and returned to Batavia 1643, June 5. Details concerning a subsequent voyage along the coasts of New Guinea and n. and n.w. Australia are exceedingly scanty. He set out on Jan. 29, 1644, discovered the Gulf of Carpentaria, made other important discoveries, and returned to Batavia, but further information is lacking. He ranks as one of the greatest navigators of the 17th century. He published a narrative of his first voyage which was reprinted in 1722 and in 1860.

TASMAN SEA: Oceanica, that part of the Pacific Ocean lying between Australia and Tasmania on the w. and New Zealand on the s.e.

TASMANIA, Australia: the smallest state of the commonwealth, consisting of the island of Tasmania and its adjacent islets, and situated 140 m. s. of the south-eastern extremity of the Australian continent, from which it is separated by Bass Strait. The area of the state is 26,385 sq.m., and of the main island 24,339 sq.m. The main island is heart-shaped, about 180 m. long from n. to s., and 150 m. wide. The coasts are bold and much indented, forming a number of excellent harbors. The interior is a plateau intersected in various directions by a number of rough and precipitous mountain ranges, rising in Cradle Mountain to a height of 5,069 ft. Some of the intervening basins contain large and beautiful lakes, and rivers are numerous. The geology is characterized by considerable outcrops of palæozoic rocks and extensive flows of tertiary basalt. The mineral wealth is great, and mining is the principal industry. The annual value of mineral products exported is more than four times that of agricultural products, and amounts to about $8,000,000. The principal products are gold, tin, silver, and copper. The climate is temperate, and the rainfall in general, sufficient. The flora and fauna are similar to those of southern Australia, but there are two remarkable animals peculiar to the island, the Tasmanian wolf, and the 'Tasmanian devil' (*Thylacinus* and *Dasyurus*), sometimes called the native tiger. The soil is very fertile, especially in the basaltic regions, and well adapted for wheat, which is the principal crop. Grazing has declined, and the manufactures are inconsiderable. The volume of trade amounts to over $20,000,000 annually. The chief exports are copper, fruits, silver, wool, tin, gold, timber, hides, and grain. Hobart, the chief port, has regular steamship connection with Europe, Australia and New Zealand. There were, in 1900, about 600 m. of railroads. At the head of the educational system is the University of Tasmania. The capital of the state is Hobart.

Tasmania was discovered in 1642 by the Dutch navigator, Tasman, who named it Van Diemen's Land, after his patron. In 1804 England established a penal colony on the island. This was maintained until 1853, when Tasmania was declared a British colony. In 1804 a settlement was formed near the mouth of the Tamar, but was removed 1806 to the spot now occupied by the town of Launceston. From 1817 began rapid increase of free settlers, who received grants of land in proportion to the capital which they brought. In 1900 it became a state of the commonwealth of Australia. The aboriginal inhabitants are entirely extinct. Pop. (1901) 172,475.

TASMANIAN, n. *tăz-mā'nĭ-ăn:* a native or inhabitant of *Tasmania* or Van Diemen's Land: ADJ. of or pertaining to Tasmania.

TASMANIAN WOLF, DEVIL, ZEBRA-WOLF, etc. See DASYURE.

TASMANNIA, *tăs-măn'nĭ-a:* genus of shrubs of nat. order *Magnoliaceæ. T. aromatica,* an evergreen bush of Tasmania, grows in the richest soils on the margins of rivers and in shady ravines, sometimes forming extensive thickets. Every part of the plant is highly aromatic and pungent. The fruit is occasionally used as pepper.

TASSEL, n. *tăs'sl* [OF. *tassel,* a fastening—from mid L. *tassellus,* a fastening for a mantle—from L. *taxillus,* a small die; *talus,* a die—*tassel* being originally a button of squared bone]: a pendent ornament, consisting of a bunch of silk or other material attached by a cord to the corners of a cushion, etc.; a silk ribbon sewed to a book, to be put between the leaves as a mark for reference. TASSELLED, a. *tăs'sld,* furnished or adorned with tassels.

TASSEL, n. *tăs'sl,* or TARSEL, n. *târ'sl,* or TERCEL, n. *tĕr'sl* [OE. *tiercel*—from F. *tierce,* a third, so named because a third less than the female (see TIERCE)]: the male of the goshawk; in *prov.* and *OE.,* a silly person: ADJ. pertaining to; silly. TASSEL or TERCEL GENTLE, *ter'sĕl gĕn'tl,* the trained male of the goshawk, specially appropriated to the use of princes in their pastime of falconry.

TASSISUDON, *tâs-sē-sô-dŏn':* town, cap. of Bhotan (q.v.), on the right bank of the Godadda, an affluent of the Brahmaputra, lat. 27° 30′ n. Many of the inhabitants are employed in manufacturing paper and in making brass images and ornaments for their places of worship.

TASSO, *tăs'ō,* It. *tâs'so,* BERNARDO: Italian poet: 1493, Nov. 11—1569, Sep. 4; b. Bergamo; father of the illustrious Torquato T. Both by his father's and by his mother's side, he was connected with the ancient family of the Tassi. His uncle, Luigi Alessandro, Bp. of Recanati, took charge of his education, and he became a fine classical scholar. Like his son, he was exceedingly fond of the patronage of noble lords and the smiles of noble ladies. Guido Rangone, gen. of the pontifical forces, intrusted him with several missions, among others to the Prince of Salerno, who appointed him his sec. In 1539 he married, at Salerno, a young lady of Sorrento, Porzia de' Rossi, who had merit as well as beauty and fortune, and who became the mother of Torquato. After the fall of the Prince of Salerno, Guidubaldo, Duke of Urbino, and Gugielmo, Duke of Mantua, sought to attach the poet to their court. The latter succeeded, and named him gov. of the city of Ostiglia, where he died.

T.'s principal writings are: *Rime* (Ven. 1531); *I tre Libri degli Amori* (Ven. 1537); *Ode e Salmi* (Ven. 1560); *L'Amadigi, Poema* (Ven. 1560); and *Il Floridante, Poema* (Mant. 1587). Of these the principal is *L'Amadigi* (Amadis), admired for sweetness and elegance of language, and for beauty of description.—For a good idea of the politics and literature of the time, see Seghezzi's ed. of his *Lettere* (3 vols. Padua 1733–51), with biographical notice.

TAS'SO, TORQUATO: one of the greatest poets of Italy 1544, Mar. 11—1595, Apr. 25; b. at Sorrento in Naples son of Bernardo T. (q.v.). His earliest education was received from the Jesuits. During his childhood, T.'s father was an exile, but the affectionate solicitude of his mother well supplied the want of paternal care. In 1554 he went to Rome to join his father, and left his mother (whom he never again saw) in a convent at Naples. At Rome, and subsequently at Bergamo, Urbino, Pesaro, and Venice, he continued his studies. He assisted his father in copying, correcting, and even in completing his poem *L'Amadigi*, though only 16 years of age. No wonder old Bernardo T. was delighted at the promise shown by his son, and prophesied greatness for him. Later, however, sad experience of the miseries of a poet's life induced him to send his son to Padua to study jurisprudence; but the youth, remaining at Padua a year, wrote *Rinaldo* (Venice 1562), a poem in 12 cantos, the hero of which is the son of Aymon, and cousin of Roland: it belongs in the class of heroic romances. After the first burst of anger was over, Bernardo forgave his son for following his example rather than his precept, and became prouder of T.'s genius than ever. T then betook himself to the Univ. of Bologna to study philosophy, and is said to have distinguished himself by facility in the discussion of the most elevated and abstract themes. On leaving Bologna, he spent some time with friends at Castelvetere, Modena, and Correggio, but returned to Padua at the request of his friend Scipio de Gonzaga, afterward cardinal, who had established a literary academy there, of which T. became a member. It was during this second residence at Padua that he conceived the idea of his great work, *Gerusalemme Liberata*, a heroic record of the conquest of Jerusalem by the Crusaders under Godfrey de Bouillon. Lamartine describes the mingled motives of the poet: 'Urged by piety no less than by the muse, Tasso dreamed of a crusade of poetic genius, aspiring to equal, by the glory and the sanctity of his songs, the crusades of the lance he was about to celebrate.' The same critic goes on to observe, in allusion to the less noble passion for the applause of courts that marked the poet: 'The names of all the noble and sovereign families of the West would be revived in this epic catalogue of their exploits, and would attract to the author the recognition and favor of the great. . . . Finally, the poet was himself a knight, noble blood flowed in his veins, to celebrate warlike deeds seemed, as it were, to be associating his name with those of the heroes who had performed them on the field of battle.' Bernardo heard of his son's design with exulting joy, and blessed Heaven for making Torquato a greater genius than himself. Meanwhile (1565), T. had been introduced by Cardinal Luigi d'Este (to whom he had dedicated the *Rinaldo*) to his brother, Alfonso II., sovereign Duke of Ferrara. Here for a time he was happy. Young, handsome, courteous, and with that proper tinge of melancholy in his disposition that is often a charm for women, he soon became a favorite with the beauties of the

court, and proceeded to paint his *Armida* and *Herminia* almost without effort. In 1570 T. visited France and spent a year, gaining the friendship of Charles IX. To attribute his subsequent miseries and madness to a presumptuous passion for Leonora, sister of the Duke of Este, which was first encouraged, then repulsed, and finally punished with imprisonment, is utterly at variance with the well-known facts, though the errors of traditions have been so specious as to impose on illustrious men. T. courted, platonically and otherwise, various ladies of the court—a pretty chambermaid even was not beneath his notice; but there is nothing to show that he lifted his eyes to the sister of his sovereign, or that such a suspicion was ever harbored by the lady herself or her brother. In truth, his madness was connected in its origin more closely with his poetry than with his loves. Having finished his great epic about 1575, he sent a copy of it to a society of scholars, critics, and churchmen at Rome, to get their opinion of it. It would have been far better had he published the poem at once, without placing it at the mercy of critics who were delighted to have the opportunity of finding fault before the public was in a position to praise. The critics would then have been forced to swell the chorus of general admiration. T. was tortured by their waspish comments, and, with pitiable suffering, proceeded to make his work more agreeable to his incapable judges. Gradually a morbid melancholy, the result of worry acting on a naturally suspicious and irritable temper, overpowered his reason; the spites and jealousies never absent from a pleasure-loving court increased his mental disorder; he believed that invisible persecutors had denounced him to the Inquisition as a heretic. In vain Alfonso and his sisters tried to calm his perturbation, and even induced the Inquisition to write him a reassuring epistle. His paroxysms increased in violence. Finally, 1577, June, he drew his dagger in the apartments of the Duchess of Urbino, to stab a domestic whom he took to be one of his secret enemies; and Alfonso had him confined in his palace and at Belrignardo for his health's sake. Next month he made his escape, under the delusion that the duke meant to kill him, and fled across the Abruzzi to his birthplace, Sorrento, where he took refuge with his sister. The air of his native place quickly restored him to health; but no sooner had he recovered than he began to yearn for the old excitements, begged Alfonso to take him back to court; and when that prince dryly informed him that he might return if he would submit to medical treatment for his malady, T. greedily availed himself of the permission; and was soon as wretched as before. Believing himself neglected and insulted, he broke into violent abuse. A new flight ensued, this time toward n. Italy. The unhappy poet wandered at last half-naked into the city of Turin, where he was humanely received by the Marquis d'Este, brother of Alfonso. After some time, he again ventured to return to Ferrara (1579), but only to lose his mental balance almost as soon as he breathed its noxious air. Alfonso shut him up in the asylum of Santa

Anna in Ferrara, in which he remained 1579-86, seven years, suffering from confinement. His treatment was at first that to which lunatics were then commonly subjected; but was soon made more agreeable, and he was permitted to see his friends. Among others he was visited by Montaigne. At this time his work was condemned by the Academy della Crusca, to whom he replied with moderation. He remained in the hospital of St. Anne till July, 1586, when he was released at the solicitation of Vincent di Gonzaga, who took him to his estates. The duke of Ferrara refused him a parting interview. Tasso now resided at Mantua, and wrote the tragedy of Torrismondo, which with a genealogical poem he dedicated to Vincent di Gonzaga. Finding that Mantua did not agree with him, he proceeded to Naples, the climate of which he found most congenial, and where he fixed his favorite residence at the monastery of Mount Oliveto. Here he composed the *Gierusalemme Conquistata,* which he dedicated to Cardinal Aldobrandini. It is a reconstruction of the *Gierusalemme Liberata,* in which he rejects the chief mystical and chivalrous ornaments of the previous poem, and plumes himself on a precise and slavish imitation of the *Iliad.* He wished it to supersede the *Liberata,* but posterity has reversed his decision as to its superiority. Aldobrandini solicited and obtained from the pope the laurel crown on behalf of Tasso. Urged by his patron, Tasso repaired to Rome, although he declared it was to die. Amid the preparations for the ceremony his health gave way. He retired from the plaudits of the public to the convent of Santo Onofrio, where he expired. Tasso's chief works include: *Gierusalemme Liberata;* the *Rime,* and the *Aminta.* The *Gierusalemme* was translated into English by Edward Fairfax in 1600. In Italian literature the *Gierusalemme* shares with the *Orlando* of Ariosto the place of the greatest epic. Both are full of poetic beauties and admirable for the interest and variety of the narrative. Those who prefer symmetry of structure give the preference to Tasso, while those who delight in almost licentious contempt of the conventionalities of art, praise the work of Ariosto. Metastasio gave his judgment in favor of Tasso. Consult Ferrazzi, *T. Tasso, studi biografici-critici-bibliografici* (1880); Serassi, *La Vita di T. Tasso* (3d ed. with notes by Guasti 1858).

TASTE, v. *tāst* [It. *tastare;* OF. *taster,* to handle, to feel by the sense of touch—from a supposed mid. L. *taxĭtārĕ,* to touch often—from L. *tangĕrĕ, tactum,* to touch: Ger. *tasten,* to feel or grope]: to perceive and distinguish by means of the tongue or palate; to have perception of the flavor of; to test by the tongue; to try the relish of; to obtain pleasure from; to experience; to undergo; to have a particular flavor or relish; to eat or drink a little; to have a particular quality or flavor; to enjoy sparingly; to take to be enjoyed: N. act of

tasting; the peculiar sensation excited by bringing a substance into contact with the tongue and palate, differing according to the substance; the sense by which we perceive the relish of a thing (see below): relish; flavor; a little eaten, or drunk, or used, as a specimen; nice perception; judgment; discernment; the faculty of discerning beauty, order, or whatever constitutes excellence in human performances; intellectual discernment; manner, style, or choice, either good or bad, with respect to what is pleasing; in *OE.*, essay; trial; experiment. TAST'ING, imp.: N. act of perceiving by the tongue; the sense by which we distinguish savors. TAST'ED, pp.: ADJ. having a particular relish. TAST'ABLE, a. *-ă-bl,* capable of being tasted; savory. TASTE'FUL, a. *-fûl,* having a high relish; savory; possessed of a good taste; having a pleasing style or manner, as in dress or in doing a thing. TASTE'FULLY, ad. *-lĭ.* TASTE'FULNESS, n. *-nĕs,* the state or quality of being tasteful. TASTE'LESS, a. *-lĕs,* without taste; having no power of giving pleasure. TASTE'LESSLY, ad. *-lĭ.* TASTE'LESSNESS, n. *-nĕs,* the state of being tasteless; want of relish; insipidity. TAST'ER, n. *-ėr,* one who tastes; one who judges wines or teas by tasting them; a small instr. used in sampling cheese, ham, wine, or the like. TAST'Y, a. *-ĭ, familiarly,* palatable; displaying nice perception of excellence; in conformity to the principles of good taste; elegant; fine. TAST'ILY, ad. *-lĭ,* with a good manner and style of doing. —SYN. of 'taste, v.': to try; feel; relish; approve; eat; —of 'taste, n.': gustation; sensibility; perception; savor; relish; flavor.

TASTE: one of the senses—that by which is perceived the flavor or relish of substances. The principal seat of the sense of taste is the mucous membrane of the tongue, in which dissection reveals a *cutis* or *chorion,* a *papillary structure,* and an *epithelium.* Of the *cutis,* it is sufficient to remark that it is tough, but thinner and less dense than in most parts of the cutaneous surface, and that it receives the insertions of the intrinsic muscles of the tongue, which will be described when that organ is treated of generally. The *papillary structure* differs from that of the skin in not being concealed under the epithelium, but in projecting from the surface like the villi of the digestive canal, thus giving the tongue its well-known roughness. The *Epithelium* (q.v.) is of the scaly variety, as on the skin, but is much thinner on the tongue than on the skin: it is most dense about the middle of the upper surface of the tongue, and here, in disordered digestion, is the chief accumulation of *fur,* which is simply an overabundant formation of epithelium. The *papillæ* on the surface of the tongue are either *simple* or *compound.* The former, which closely resemble those on the skin, are scattered over the whole surface of the tongue in parts where the others are not, and they likewise participate in the formation of the

compound papillæ, which, from their forms, are respectively termed (1) the *circumvallate* or *calyciform*, (2) the *fungiform*, (3) the *conical* or *filiform*.

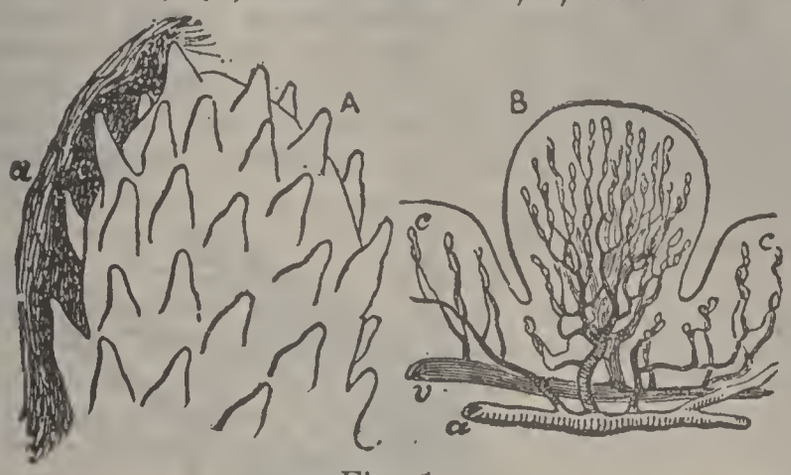


Fig. 1:

A, *Fungiform papilla*, showing the simple papillæ on its surface; and, at *a*, the epithelium investing them (magnified 35 diameters). B, a similar papilla, with the capillary loop of its simple papillæ injected: *a*, artery; *v*, vein. Around the base there is often a groove, which is here shown; as also are the capillary loops, *c*, *c*, of two of the neighboring simple papillæ (magnified 18 diameters).

The *circumvallate* papillæ, eight or ten in number, are situated in the form of a V at the base of the tongue: their function seems to be to secrete mucus, as well as to take part in the act of tasting. They consist of 'a central flattened projection of the mucous membrane of a circular figure, and from $\frac{1}{20}$ to $\frac{1}{12}$ of an inch wide, surrounded by a tumid ring of about the same elevation.' They are shown in the figure of the surface of the ton-

Fig. 2.—Various forms of Conical Compound Papillæ:

a, *b*, *c*, provided with the stiffest and longest epithelium, and the simple papillæ much ecuminated; *d* approximates to the fungiform, and *e* and *f* to the simple papillæ. (Magnified 20 diameters.)

gue (see TONGUE). The *fungiform* papillæ are scattered over the surface in front of the circumvallate papillæ, and about the sides and apex. They are usually narrower at the base than at the apex, where they are about $\frac{1}{20}$ of an inch in diameter. They are covered with simple or secondary papillæ, and their investing epithelium is so thin that the blood circulating in them gives them a red color, not seen in the conical papillæ among which they are distributed. They contain nerves terminating in

loops. The shape of the *conical* or *filiform* papillæ is indicated by their names; and even if they take little part in the sense of taste directly, it is convenient to describe them here. Their avorage length is about $\frac{1}{10}$ of an inch. (For their structure, see the accompanying diagrams.) They terminate in long pointed processes, which are bathed by the mucus of the mouth, and are capable of moving in any direction, though they are

Fig. 3:

A, vertical section near the middle of the dorsal surface of the tongue, showing the basement membrane, on which lie *a, a,* fungiform papillæ; *b, b,* filiform papillæ, with hair-like processes; *c, c,* similar papillæ devoid of these processes. B, a filiform compound papilla, magnified 300 diameters: *a,* artery; *v,* vein; *c,* capillary loop; *d,* a secondary papilla deprived of *e,* epithelium; *f,* hair-like processes at the apex.

generally inclined backward. Some of the stiffer of these epithelial processes inclose minute hairs. Notwithstanding the difference in their outward form and mode of arrangement, the simple papillæ, which have been detected as scattered over the whole dorsum of the tongue (though concealed under the common sheet of epithelium), and those clothing the circumvallate and fungiform

papillæ, do not seem to present any structural difference; and their epithelium, which is very thin, readily permits the transudation of sapid substances dissolved in the mucus of the mouth. With regard to the use of the singular configuration of the circumvallate and fungiform papillæ, it may be conjectured that the fissures and recesses about their bases are designed to arrest on their passage small portions of the fluids in which the sapid materials are dissolved, and thus to detain them in contact with the most sensitive parts of the gustatory membrane.

There has been much discussion regarding the precise seat of the sense of taste and the true nerves of taste. Although the surface of the tongue is the special seat of gustative sensibility in man, the sense of taste is not restricted to that organ, being diffused, in less degree, over the soft palate, the arches of the palate, and the fauces. Moreover, the gustative sensibility varies on different parts of the surface of the tongue. It is generally allowed that acute taste resides at the base of the tongue, over a region of which the circumvallate papillæ may be taken as the centre, and also on the sides near the base. These parts are supplied solely by the glossal twigs of the glosso-pharyngeal nerves. Some writers, amongst whom are Valentin and Wagner, believe the middle and anterior parts of the dorsum of the tongue to be usually incapable of appreciating flavor; while numerous others hold the contrary opinion. Sour, sweet, and bitter substances applied to the sides, and especially to the tip of the protruded tongue, are at once distinguished; though when placed on the middle of the dorsal region they make little or no impression till pressed against the roof of the mouth. This region of the tongue is supplied almost solely by the lingual branch of the fifth nerve. It may be concluded with regard to the tongue that the whole dorsal surface possesses taste, but especially the circumferential parts, viz., the base, sides, and apex.' The investigations of Todd and Bowman further show that the soft palate and its arches are endowed with taste in some persons, but not universally, while they got no evidence in any case of gustative sensibility on the pharynx, gums, or elsewhere. The soft palate and its arches are supplied by palatine branches from Meckel's ganglion, and sparingly by the glosso-pharyngeal nerves. From (1) evidence afforded by the anatomical distribution of the nerves to parts enjoying the sense of taste, (2) evidence of experiments, in which the various nerves of the tongue were divided, (3) evidence afforded by disease, it may be safely inferred that the glosso-pharyngeal and the lingual branches of the fifth pair of nerves respectively participate in the sense of taste; and there is reason to attribute a share also to the palatine branches of the fifth.

Impressions of taste may be produced by a mechanical or chemical experiment of the gustatory nerves. A quick

light tap of the finger on the tip of the tongue causes a taste, sometimes acid, sometimes saline, which lasts for several seconds; and galvanism acts similarly. If the surface of the tongue, near the root, be touched with a clean dry glass rod, or a drop of distilled water be placed on it, a slightly bitterish sensation is produced; and if the pressure be continued, a feeling of nausea ensues. If a small current of cold air be directed against the tongue, it excites a cool saline taste like that of saltpetre. From experiments by E. H. Weber, it appears that one of the conditions requisite for due exercise of the sense of taste is a temperature not departing far from the natural standard: thus, if the tongue be immersed for a minute in water at a temperature of 125°, or in iced water, the taste of sugar, etc., is no longer perceived. In order that sapid bodies should cause taste, it is necessary that they should be dissolved, and made to permeate the tissue of the papillæ, so as to come in contact with their nerves. This is proved by the two following facts: 1st, that every substance, solid, fluid, or gaseous, which possesses a distinct taste, is more or less soluble in the fluids of the mouth, while substances perfectly insoluble are recognized only by the sense of touch; and 2d, that if the most sapid substance be applied in a dry state to a dried part of the surface of the tongue, no sensation of taste is excited. Bitters and acids appear to be the most sapid bodies, since they may be diluted to a greater extent than any other known substances without ceasing to excite sensations of taste: thus, according to Valentin, 1 part of extract of aloes, or of sulphuric acid, in 900,000 of water, and even 1 part of sulphate of quinine in 1,000,000 parts of water, may, with ease, be distinguished from perfectly pure water. 'The contact of a sapid substance,' says Dr. Carpenter, 'much more readily excites a gustative sensation when it is made to press upon the papillæ, or is moved over them. Thus there are some substances whose taste is not perceived when they are simply applied to the central part of the dorsum of the tongue, but of whose presence we are at once cognizant by pressing the tongue against the roof of the mouth. The full flavor of a sapid substance, again, is more readily perceived when it is rubbed on any part of the tongue than when it is simply brought in contact with it, or pressed against it. Even when liquids are received into the mouth, their taste is most completely discriminated by causing them to move over the gustative surface: thus, the 'wine-taster' takes a small quantity of the liquor in his mouth, carries it rapidly over every part of its lining membrane, and then ejects it. Most sapid substances affect the nerves of smell to a greater or less degree, as they pass down the throat; and it is this compound of taste and smell that constitutes *flavor*. It is a common habit to hold a child's nose when he is taking a nauseous draught, with the view, as is supposed, of deadening the

taste. The efficacy of the process depends on the exclusion of smell, and the reduction of the flavor of the medicine to its mere taste. The agreeable sensation produced by sipping good wine is due to what is termed its *bouquet*—i.e., its flavor, or combined taste and smell. Some substances leave a taste in the mouth very different from that which they first produced. This *aftertaste* is usually bitter; but in the case of one of the most bitter substances known, namely, tannin, it is sweet. This connection seems, in a degree, to correspond to the complementary colors in vision.

There can be no doubt that the sense of taste has for its primary object to direct us in the choice of food, to make the act of eating agreeable and to excite the flow of mucus and saliva, which aid the digestive process; and among the lower animals, the instinctive perceptions connected with this taste are much more remarkable than in man. As a general rule, it is found that those substances whose taste is agreeable are useful articles of food, and *vice versâ;* though there are well-known exceptional cases. Sir Henry Holland observes that, in the majority of instances of actual illness, the desires of the patient as to food and drink may be safely complied with, even when some seeming extravagance of diet is suggested; and that, in the early stage of recovery from gastric fevers, he has seen many curious instances of such contrariety to all rule acquiesced in with manifest good to the patient. 'Dietetics,' he adds, 'must become a much more exact branch of knowledge before we can be justified in opposing its maxims to the natural and repeated suggestions of the stomach, in the state either of health or disease.'

TASTE: in æsthetics, the faculty of discriminating the qualities of beauty, harmony, etc., particularly in art and literature, joined to a capacity for appreciating and enjoying excellence. See ÆSTHETICS.

TASTO, ad. *tăs'tō* [It., touch]: in *mus.*, a direction that the passage to which it is affixed is to be played in unison, without accompanying chords.

TATAR. See TARTAR 1.

TATARS, *tâ'târz:* correct though not usual form for TARTARS (q.v.).

TATE, *tāt,* HENRY: English merchant and philanthropist: b. Chorley, Lancashire, 1819; d. Streatham 1899, Dec. 5. He was a sugar merchant in Liverpool and amassed a fortune through the invention of loaf sugar. He became famous for his benefactions, giving £42,000 to the Liverpool University College, a still larger sum to Liverpool hospitals, and four free libraries to the parish of Lambeth. He established a large private gallery of modern paintings at Streatham, afterward building for the collection a gallery near Vauxhall Bridge, at a cost of £80,000. This institution, known as the 'Tate Gallery,' was opened in 1897.

TATE, *tāt*, NAHUM: poet and dramatist: 1652–1715, Aug. 12; b. Dublin; son of the Rev. Dr. Faithful T. He was educated at Trinity College, Dublin. He removed to London, and 1692 he succeeded Shadwell as poet-laureate, and held that dignity till his death. His habits were improvident, and in the latter part of his life he resided within the precincts of the Mint at Southwark, then a privileged sanctuary for debtors. His writings include nine or ten dramatic pieces, *Panacea, or a Poem on Tea*, various birthday odes, and an elegy on the death of Queen Mary. He lived to write the first birthday ode for George I. But T. is best known by his metrical version of the Psalms, in conjunction with Dr. Nicholas Brady (q.v.), chaplain to King William and Queen Mary—which was attached to the Prayer-book, and came into general use in the Church of England, supplanting the older version made in the reign of Edward VI. by Sternhold and Hopkins.

TATHAM, *tăt'am*, WILLIAM: soldier and author: 1752–1819, Feb. 22; b. Hutton, England. In 1769 he emigrated to Va., engaging in mercantile pursuits. Prior to the revolution he was adjt. of militia against the Indians; was col. of cav. in the revolution; was admitted to the bar 1784; removed to N. C. 1786, and became a member of its legislature. In 1801–05 he was supt. of docks, London, Eng.; 1817–19 U. S. milit. store-keeper. He committed suicide at the Richmond arsenal.

TATIAN, *tā'shĭ-an:* one of the early apologists of Christianity against the pagan philosophers, and founder of a sect which, whether under his own name or under various other appellations derived from its peculiar tenets or practices, attracted considerable notice in the primitive ages: b. probably in Assyria conjecturally before 130; d. at unknown date, but prob. after 172. Having cultivated rhetoric and philosophy in various places, he came to Rome about 150, where he became disciple and friend of Justin the Martyr, and was by him converted to Christianity. He is known to have written many works, of which, however, only the *Apology* is preserved. The date of its composition is uncertain, but it was probably before the death of Justin 166. T.'s famous *Diatessaron*, the earliest attempt at a complete Harmony of the Gospels, was one of the lost works; but researches since 1877 have restored the work on the basis of Ephraem's gospel commentary—so far at least as concerns its main features. The *Diatessaron* is considered of high importance as testimony to the fact that in 160 the New Test. canon had not become finally established; to the fact that in 160 our four gospels had general prominence in the church, and that no other gospels had; to the fact that the fourth gospel held (160) a fixed place with the other three; and to the fact that, in the main and essentially, the text of our gospels was then the same as now, though about that time some alterations were beginning to be intentionally made. No trace appears in the *Apology* of the heterodox opinions of T.; and it is alleged by Tertullian that it was not till after the death of Justin that he fell into the errors to which he has given a name

He then removed to the East, and is said to have established himself in Mesopotamia. Without entering into the details of T.'s peculiar opinions, it is enough to say that—especially in their moral aspect, and in their aim to develop a theoretic basis for a doctrine of entire renunciation of the world by Christians—they form the foundation of one of the great divisions of Gnosticism (q.v.). Starting from the common principle of dualism, and of the origin of matter from the evil principle, and its consequent evil nature, T., unlike the Egyptian Gnostics, held the necessity of overcoming the corrupt nature of man, and purifying it by abstinence and ascetic rigor. Accordingly, he reprobated marriage, and condemned all sensual indulgence. One of his 'opinions,' affirming the damnation of Adam, was peculiarly odious to the orthodox party. He condemned the use of wine so strongly as to forbid it even in the celebration of the Eucharist, in which his followers permitted only water to be used, whence they received the name of *Hydroparastatai* [from *hydor*, water, and *paristemi*, I present], and in Latin *Aquarii*. From their generally rigorous asceticism, they were called *Encratites* (q.v.) [from *engkratein*, to keep continent]. In their dogmatic views as to Docetism, the Demiurge, and Emanations, they differed little from other Gnostics of the Syrian school. T.'s doctrinal errors, though they necessitate his being classed with an abhorrent company, can largely be traced to his early pagan training in Greek and oriental philosophies, and had their home in his intellect rather than in his heart.—See GNOSTICS: MANICHÆANS: MYSTICISM.

TATIUS, *tā'shĭ-ŭs*, ACHILLES: one of the later Alexandrine authors, of whose life nothing is known. He was formerly thought to have lived in the 2d or 3d c.; but as he undoubtedly imitated the style of Heliodorus of Emesa, he cannot be placed earlier than the beginning of the 6th c. (see NOVELS). Suidas, who calls him Achilles Statius, says that he was originally a pagan, but was converted to Christianity, and rose to be a bishop. If this be true, the romance which has preserved the author's name, *Ta Kata Leukippen kai Kleitophōnta* (The Loves of Leucippe and Cleitophon), must have been composed in his pagan days, for it is in parts too licentious and heathenish to be the work of a Christian convert.

TATNALL, *tăt'nal*, JOSIAH: soldier and statesman: 1762–1803, June 6; b. Bonaventura, Ga. Though his family were tories, he joined the colonial army and served during the revolution. He became successively capt., col., and brig.gen. He was a member of the Ga. legislature, U. S. senator from Ga. 1796–99, and gov. 1801–2. He died at Nassau, New Providence, Bahamas.

TATTA, n. *tăt'tă* [Hind. *tatta*]: a frame or trellis of the fibre of cuscus-grass, hung before the open doors and windows of houses in India, and over which water is constantly sprinkled in order to cool the air: also spelled TATTY, TATTIE.

TATTA, *tât'tâ* (correctly, THATTA, *tât'tâ*): town of Sinde, on the right bank of the Indus, at the head of the delta of that river, 64 m. e. of Kurrachi. In former times, T. was a flourishing town, and manufactured fabrics of silk and cotton. The mosque of Shah-Jehan, built of brick, is now falling into decay. The vast cemetery of T. has an area of 6 sq. m., containing, it is calculated, at least a million tombs, and has room for not less than four millions.—Pop. of T. about 10,000.

TATTER, v. *tăt'tĕr* [Icel. *töturr*, a rag: Low Ger. *taltern*, tatters: Bav. *tattern*, to tremble, to shiver—the primary image being the fluttering of the torn fragments]: to rend or tear into rags. TAT'TERS, n. plu. *-tĕrz*, loose torn pieces hanging from a garment. TAT'TERING, imp. TAT'TERED, pp. *-tĕrd:* ADJ. torn; hanging in rags. IN TATTERS, in rags or loose pieces, as a garment.

TATTERDEMALION, n. *tăt-tĕr-dĕ-māl'yŭn* [Eng. *tatter*, a rag, and OF. *maillon*, long clothes]: a ragged dirty fellow; a ragamuffin.

TATTERSALL'S, *tăt'ĕr-salz:* famous mart in London, for sale of horses, so called from Richard Tattersall (d. 1795), groom to the second Duke of Kingston. It was established near Hyde Park Corner 1766, but was removed to Brompton 1865, Apr. Its racing subscription-room is a great rendezvous for patrons of the turf.

TATTING, n. *tăt'tĭng:* a kind of netting or lace made with strong soft cotton by means of a shuttle and pin; the process of making such netting.

TATTLE, n. *tăt'tl* [imitative of rattling gabbling talk, represented by the syllables *ta, ta, ta:* Low Ger. *tateln*, to gabble like a goose: Dut. *tateren*, to stammer]: idle trifling talk; chatter: V. to talk idly; to tell or communicate trifling idle stories; to blab; to speak much with little meaning. TAT'TLING, imp. *-tlĭng:* ADJ. given to idle talk; apt to tell tales: N. idle talk. TATTLED, pp. *tăt'tld.* TAT'TLER, n. *-tlĕr*, an idle talker. TAT'TLERY, n. *-ĭ*, idle talk or chat. TAT'TLINGLY, ad. *-tlĭng-lĭ.*

TAT'TLER: see SANDPIPER.

TATTOO, n. *tăt-tō'* [the beat of the drum is represented by various combinations of the syllables *rap, tap, tat*, or the like: F. *rataplan:* Sp. *taparapatan:* It. *tappata:* Dut. *taptoe*]: the beat of drum at night to warn soldiers to repair to their quarters. TO BEAT THE DEVIL'S TATTOO, *familiarly*, to drum idly and monotonously with the ends of the fingers on the table, etc., or similarly on the floor with the foot.

TATTOO, v. *tăt-tō'* [Tahitian, *tatau*, tattoo-marks—from *ta*, a mark]: to mark the skin, generally that of the face or arms, with figures, of various kinds, by means of punctures and a coloring substance: N. lines and figures made on the skin of the body, and afterward stained to render them permanent. TATOO'ING, imp.: N. act or operation of puncturing the skin and staining the spots with a colored substance; the lines and figures thus formed (see below). TAT'TOOED', pp. *-tōd':* ADJ. marked by stained lines or figures on the body.

TATTOOING, *tăt-tō'ĭng:* marking the skin with figures of various kinds, by means of slight incisions or punctures and a coloring matter. The term (of Polynesian origin) is said to be derived from a verb *ta*, to strike. T. is almost universal in the South Sea Islands, except where Christianity and civilization have put an end to it. The T. of the New Zealanders and other South Sea Islanders often covers the whole face, sometimes also the chest, arms, and other parts of the body, with elaborate pattern : it is performed in youth, and marks the transition from boyhood to manhood, like the assumption of the *toga virilis* among the ancient Romans. An instrument of bone, toothed on the edge, is applied to the skin, and struck with a piece of wood, having first been dipped in a thick mixture made by rubbing down charcoal with a little water. The marks which result are permanent, and appear black on a brown skin; though they are dark blue on the skin of a European. T. is, or has been, practiced in almost all parts of the world. It seems to be one of the practices prohibited to the Jews, Lev. xix. 28, 'Ye shall not make any cuttings in your flesh for the dead, *nor print any marks upon you*,' from which may be inferred its connection with the superstitions of the surrounding heathen. The Bedouin Arabs, the Tunguses, and other eastern tribes, many tribes of American Indians, and certain classes of the Japanese, practice it at the present day. Among the Bedouins it is a favorite mode of female adornment. Among the ancient Thracians it was distinctive of high rank. The ancient Britons also practiced it, and traces of it appear to have lingered in England till after the Norman conquest.

TAU, n. *taw* [Greek name of the letter *t*]: in *entom.* a species of beetle; a species of moth; a kind of fly: in *her.*, the cross of St. Anthony, called also the Tau Cross

TAUCHNITZ, *towch'nĭts*, Karl Christoph Traug: German printer and bookseller: 1761–1836; b. Grosspardau, near Leipzig. Bred a printer, he began, 1796, a small printing business in Leipzig, to which he soon added publishing and type-founding, and which became one of the greatest establishments of the kind in Germany. In 1809 he began the issue of a series of editions of the classic authors, whose elegance and cheapness gave them a European circulation. By offering a prize of a ducat for every error pointed out, he was able to bring out, 1828, an edition of Homer of extraordinary correctness. He was the first to introduce (1816) stereotyping into Germany; and he applied it to music also, which had not been attempted before. In his latter years he stereotyped the Hebrew Bible, and the Koran in the original Arabic. On his death the business was continued by his son, Karl Christian Phil. T.—A nephew of the elder T., Christian Bernh. Tauchnitz, also set up a publishing establishment in Leipzig, combined with printing. Among the most noted of his undertakings is the well-known issue of 'British Authors' (begun 1842), of which more than 2,000 vols. have appeared. Ennobled 1860, T. was made one of the few Saxon life-peers 1877.

TAUGHT, v. *tawt:* pt. of TEACH, which see.

TAUGHT: a variant of tight; see TAUT.

TAULER, *tow'lĕr*, JOHANN: remarkable mystic writer and preacher: about 1300–1360, June 19; b. Strasburg. About 1308, renouncing a considerable fortune, he entered into the mendicant order of Dominicans: afterward studying theology in Paris, he showed at that early period a predilection for speculative and mystic writings, as the scholastic philosophy and the prevailing theology of the schools did not satisfy him. Notwithstanding this tendency, his predominating practical turn of mind led him, on his return to Strasburg, to preaching and pastoral duty; and in this he continued with zeal and undaunted courage, even when, in consequence of the excommunication which the pope had hurled against Emperor Ludwig, the country had fallen into dreadful distraction, and almost all the clergy in obedience to the interdict by the bp. of Strasburg had suspended worship. Although T. had come to middle life, and had had celebrity for several years as a preacher, so powerfully (it is said) was he influenced by a Waldensian, Nicholas von Basel, who visited him 1340, that he gave himself up for two years to ascetic exercises and devout contemplation (see FRIENDS OF GOD). Afterward he betook himself to vigorous exertions on behalf of the despised and oppressed people; and preached with wonderful power, inveighing against the avarice, ostentation, and selfishness of the laity as well as of the clergy; and, though not departing from the doctrines of the church, yet fearlessly exposing its abuses, not sparing even the pope. Thus it happened that, though he had indefatigably administered the consolations of religion in the midst of the horrors and desolation of the Black Death (q.v.), the bishop interdicted him from preaching, and he was obliged to quit his native town. He repaired to Cologne; but nothing further is known, either of his residence there or of his return to Strasburg, where, after a life full of toil, denial of self, and beneficence to others, he died, and was buried in his cloister. If not the greatest German preacher of the middle ages, T. certainly was the greatest of his own times. As his mysticism was in no wise passive, but aimed at rising above the sad condition of his times and the failings of the church by inward piety and a love self-denying but at the same time active, so his style, both in his preaching and in his devotional works, was lively, impressive, picturesque, and had altogether a practical direction. T. represents the highest and purest style of German mysticism (see MYSTICISM). Among his devotional works, the *Nachfolge des armen Lebens Christi* holds the first place. Whether the sacred hymns which bear his name really belong to him is doubtful. Of his writings and sermons, in which he always used the German language, many have been preserved in MS.; and since 1498 numerous editions have been published, but untrustworthy, and often translated into the dialect of the place where they happened to be printed. A careful translation into new High German has been published by

Schlosser (*Predigten*, 3 vols. Frank. 1826); *Nachfolgung des armen Lebens Christi* (Frank. 1833); Schmidt, *Johann Tauler von Strassburg* (Hamb. 1841); and Susannah Winkworth, *Life and Times of Tauler*, with 25 of his sermons translated from the German (Lond. and New York 1857). See also Vaughan, *Hours with the Mystics*, I.

TAUNT, v. *tânt* or *tawnt* [OF. *tanter*, to tempt, to move to evil: F. *tancer*, to chide, to rebuke—from L. *tentārĕ*, to try, assail, agitate (see TEMPT)]: to reproach with severe or insulting words; to censure with scoffs or mockery; to upbraid: N. a severe and insulting reproach; bitter censure; ridicule; invective. TAUNT'ING, imp.: ADJ. addressing in bitter or insulting words; scoffing. TAUNT'ED, pp. TAUNT'ER, n. *-ĕr*, one who taunts. TAUNT'INGLY, ad. *-ĭng-lĭ*, with insult; scoffingly.—SYN. of 'taunt, v.': to reproach; deride; ridicule; scoff; mock; twit.

TAUNTON, *tân'ton:* city, port of entry, and cap. of Bristol co., Mass.; at head of navigation on Taunton river, and on the Old Colony railroad; 15 m. n.-by-e. of Fall River, 17 m. e.n.e. of Providence, 34 m. s. of Boston; 50 sq. m. It is in an agricultural region, but the excellent water-power afforded by the river has made it a notable manufacturing place. Within its limits are several villages, the city proper being considered locally as the part surrounding the central park, known as Taunton Green. The city has efficient water, sewerage, gas and electric light plants; and many costly residences. It has important railroad and water connections with e. and w. points; does a large coasting trade; and for many years has been noted for manufactures of brick and iron, and for its herring fisheries.—T. contains co. court-house, city-hall, many churches (several of much beauty), public high school, grammar and graded schools, public library, Bristol Acad. (incorporated 1792), State Insane Asylum, City Almshouse, House for Aged and Infirm Women; also national banks, savings banks; and daily, weekly, and monthly periodicals. In 1903 the net debt was $1,566,914; valua. of real prop. $15,531,730; personal $5,640,832; tax-rate $1.96 on $100. In 1900 the manufacturing capital was $11,737,399, hands employed 7,102, value of products $12,594,814. The most important manufactures, according to value of products, were cotton goods, $4,593,466; foundry and machine-shop products, $2,636,390; iron nails and spikes, $628,187; pottery, terra cotta and fire-clay products, $191,333; bakery products, $177,250. Stoves, stove linings, cotton machinery, printing presses, silver-plated ware, oilcloth, cutlery, shoe buttons and eyelets, nails, jewelry, silver and brittania ware, copper and yelow metal goods, tacks, pearl buttons, and brick are specialties at T. There is also a large establishment for smelting and refining. T. was originally known by the Indian name Cohannet, and with its surroundings was the special hunting-ground of King Philip, who spared it during his famous war. It was settled by people from Taunton, England, 1638; incorporated as a township 1639, and chartered as a city 1864. Pop. (1880) 21,213; (1890) 25,448; (1900) 31,007; (1910) 34,259.

TAUNTON, *tawn'ton* (*Tone-ton*), named from being on the banks of the river Tone: town in England, in the extensive and beautiful valley of Taunton Dean, or vale of Taunton, co. of Somerset; 45 m. s.w. of Bristol by railway, 163 m. w.s.w. of London. It communicate by railway with the Bristol and English channels. The streets are wide, well paved, and lighted; the shops are modern and capacious, but the formerly extensive woolen and silk factories have almost wholly departed. Assizes are held here twice yearly. T. is the head-quarters of the Somerset Archæological and Nat. History Soc., with its extensive museum in the ruins of the Norman castle—rich especially in fossils from the Devonian strata, and bones of mammalia of the cave period from Mendip and the Somersetshire gravels—and with a reading-room. There are a collegiate school founded by Bishop Fox 1522, two dissenting colleges, several other good schools, and many charitable and other institutions. Ina, King of the West Saxons, built a castle in T. about 700. This was soon after destroyed, but another fortress was built on the site after the Conquest, at which period the town had a mint. In 1127 Giffard, Bp. of Winchester, built and endowed a priory for the canons of St. Augustine; and in 1322 we find a house of Carmelite friars. The Church of St. Mary is a magnificent specimen of Perpendicular architecture, famous for its graceful and delicately ornamented tower. The Church of St. James was the conventual church of T. Priory. The Shire Hall and the Literary Institution are handsome modern buildings. To T. Castle, Perkin Warbeck fled when he failed in storming Exeter. During the civil wars between Charles and the parliament, the town was twice besieged by Goring, and twice successfully defended by Colonel Blake. In T., Monmouth received the heartiest welcome, and Judge Jeffreys exercised his unbounded cruelty. Pop. (1881) 16,614; (1891) 25,448.

TAU'NUS MOUNTAINS: see NASSAU.

TAURIDA, *tow'rĭ-da:* government in s. Russia, bounded e., s. and s.w. by the Sea of Azov and the Black Sea; area, 24,540 sq. m., 6,990 sq. m. belonging to the Crimea. The peninsula of the Crimea (q.v.) forms the s. portion of the govt. and is connected with the n. portion by the Isthmus of Perekop (q.v.) The region n. of the isthmus is flat; the Crimea contains mountain-ranges which rise above 5,000 ft. The only great river is the Dnieper, which is the n.w. boundary; other principal streams are the Salgir and Alma in the Crimea. Among the salt lakes of the Crimea, which are very productive in salt, the Lake of Sakky is famous for the efficacy of its waters in certain diseases. The climate is temperate and warm on the s. shores of the Crimea. The soil is fertile, but cultivation is very limited. In the n. the pasturage is very rich, and cattle-

breeding is the main employment. In the s. the mountains are clad with forests, the tobacco plant is cultivated, and fruit-growing and wine-culture are principal occupations. The Crimean wines, whose *bouquet* resembles that of Burgundy and the Rhenish wines, are of very good quality. The native riches of T., its excellent ports and harbors, promise commercial progress. Simferopol (q.v.), in the Crimea, is the cap., and Sebastopol (q.v.) and Theodosia are ports of increasing importance.—Pop. (1883) 940,530—247,780 being in the Crimea (1897) 1,443,566.

TAURIDES, n. *taw'rĭ-dēz:* in *astron.*, meteors having their radiant point in the constellation Taurus.

TAURIN, n. *taw'rĭn* [L. *taurus*, a bull—named from having been discovered first in the bile of the ox]. $C_2H_7SNO_3$, crystalline substance occurring in bile and in other animal products and tissues. In a state of purity, it forms six-sided glistening prisms, which are perfectly transparent, neutral, devoid of odor, readily soluble in hot water, but difficult of solution in cold water, and insoluble in alcohol and ether. It does not enter into combination with either acids or bases. When heated, it undergoes decomposition, and evolves sulphurous acid, in consequence of the sulphur (more than 25 per cent.) which it contains. As a product of the decomposition of the bile, it may be found in the contents of the intestine and in the excrements; and in cases of jaundice it has been found in the blood, transudations, and urine. For its artificial formation, see SYNTHESIS.

TAURINE, a. *taw'rĭn* [L. *taurus;* Gr. *tauros*, a bull]: of or relating to a bull; bull-like; bovine. TAU'RUS, n. *-rŭs*, the second in order of the twelve signs of the zodiac, containing, among others, the constellations *Pleiades* and *Hyades*. TAU'RICORNOUS, a. *-rĭ-kawr'nŭs* [L. *cornu*, a horn]: horned like a bull. TAU'RIFORM, a. *-fawrm* [L. *forma*, a shape]: formed like a bull.

TAUROCHOLIC, a. *taw'rō-kŏl'ĭk* [Gr. *taurŏs*, a bull; *chŏlē*, bile]: an acid procured from the bile of the ox, and found in quantity in the bile of man. TAU'ROCOLL, n. *-rō-kŏl* [Gr. *kolla*, glue]: glue made from a bull's hide.

TAUROME'NIUM: see TAORMINA.

TAU'RUS, MOUNT: see ANATOLIA.

TAUT, a. *tawt:* tight; not slack; firm; secure; properly ordered; prepared against emergency.

TAUTAUG': see TAUTOG.

TAUTOCHRONE, n. *taw'to-krōn* [Gr. *tauto*, for *to auto* the same; *chronos*, time]: in *math.*, a curve, such that a heavy body rolling down it, under the influence of gravity, will always reach the same point at the same time, from whatever point it may start.

TAUTOG, *taw-tŏg'* (*Tautoga onitis* or *Americana*): fish of family *Labridæ* (q.v.). It is found on the Atlantic coast of the United States, and is in great request for the table, bringing a high price in the New York market. It attains a size of 12 or 14 lbs. Its color is black on the back and sides; the belly is whitish; both jaws have a double row of strong conical teeth; the face is covered with a scaleless integument. The T. is caught by hook and line on rocky bottoms. It is sometimes kept to fatten. Other names given to it are oyster-fish and black-fish—the latter name applied to other fish, including some of the dolphins.

TAUTOLOGY, n. *taw-tŏl'ŏ-jĭ* [Gr. *tautologĭa*, tautology—from *tautos*, the same; *logos*, a word]: needless repetition of the same idea or meaning in different words or phrases; it is classed among the worst vices of style. TAUTOLOGICAL, a. *taw'tō-lŏj'ĭ-kăl*, marked or characterized by tautology. TAU'TOLOG'ICALLY, ad. *-lĭ*. TAUTOLOGIZE, v. *taw-tŏl'ŏ-jīz*, to repeat the same idea or meaning in different words. TAUTOL'OGIZING, imp. TAUTOL'OGIZED, pp. *-jīzd*. TAUTOL'OGIST, n. *-jĭst*, one who tautologizes.

TAUTOPHONY, n. *taw-tŏf'ō-nĭ* [Gr. *tautos*, the same; *phōnē*, sound]: repetitition of the same sound. TAU'TOPHON'ICAL, a. *-tō-fŏn'ĭ-kăl*, repeating the same sound.

TAVERN, n. *tăv'ĕrn* [F. *taverne*, a tavern—from L. *taberna*, a shed—akin to *tabŭla*, a board, a plank—*lit.*, a boarded hut]: an inn or inferior hotel; place of entertainment for man and beast; public-house: see INN: INNKEEPER: PUBLIC-HOUSES: HOTEL.

TAVERNIER, *tâ-vĕr-ne-ā*, JEAN BAPTISTE, Baron D'AUBONNE: French traveller: 1605–89; b. Paris; son of a Flemish engraver who had settled there. The conversation of the savants who frequented his father's shop inspired him with curiosity to visit other countries, and he left the parental roof before his 15th year. After visiting England, the Low Countries, Germany, Hungary, and Italy, he eagerly caught at the offer made to him by Father Joseph (confidant of Richelieu), to accompany two French noblemen to the East. This journey (1630, Dec.—1633) was through Regensburg, Dresden, Vienna, Constantinople (where he left his masters), Erzeroum, Tabriz, Ispahan, Bagdad, Aleppo, and Scanderoon, and thence by sea to Rome. T. then obtained an important post in the household of the Duke of Orleans, with occasional leaves of absence for journeys in the East. The *second journey* (1638–43) was from Marseilles to Scanderoon, thence across Syria to Ispahan, s.w. Persia, and Hindustan; the *third* (1643–49), through Ispahan, much of Hindustan, Batavia, and other parts of the E. Indies; and in the *fourth* (1651–55), *fifth* (1656–?), and *sixth* (1663–69), various portions of Persia and Hindustan were visited, the outward route being generally by way of Syria and the Arabian desert, and the return by Asia Minor. T. invariably travelled as a dealer in precious stones and other valuable articles of small bulk, and his great profits strongly impressed on him the advantages of regular commerce between Europe and

the East. On his return to France 1669, he was graciously received at court by Louis XIV., who presented him with 'letters of nobility' in reward for his services to French commerce in India. But his prodigal expenditure and careless generosity speedily reduced his fortune, and the revocation of the Edict of Nantes compelled him as a Protestant to take refuge in Switzerland, whence he removed to Berlin and became director of an East India company projected by the elector of Brandenburg. To discover a road to the Indies through Russia, he set out from Berlin 1688, but died at Moscow. An account of his travels was written for him (for Tavernier had no literary qualifications), and though full of matter valuable to the historian and geographer, it is so ill-arranged as to be in many cases almost unavailable. Tavernier was one of the most remarkable of travellers; wholly devoid of classic sentiment, he traversed the plains of Troy, and passed the ruins of Persepolis without even a flutter of interest; and partly because of this remarkable condition of mind, his statements are distinguished by an unusual truthfulness. But the chief value of his book is in the fullness and accuracy of its details concerning the nature and state of oriental commerce, the chief markets and commercial routes, and the various systems of coinage and their relations. Some of his statements concerning the conduct of the Dutch in the East Indies called forth a most virulent and abusive reply from Jurieu, the Prot. theologian, in his *L'Esprit de M. Arnauld* (1684), and a more moderate one for Van Quellenburgh; but all Tavernier's important assertions were found perfectly correct. His Travels were originally pub. in 3 vols. (two in 1676-7, the third 1679); they have since been several times repub., last in 1810, in 7 vols.; English translation, (1678-84, 2 vols.), Dutch (1682), German (1684).

TAVISTOCK, *tăv'ĭs-tŏk:* market-town of Devonshire, England; on the w. border of Dartmoor, 113 m. w.s.w. of London, about 35 m. s.w. of Exeter, in the fertile valley and on the right bank of the Tavy (whence its name), which is here crossed by two bridges. Tavistock has manufactures of serges and woolen cloths, iron-foundries and mining-works—copper, lead, tin, and iron being found in the neighborhood; but the population is chiefly agricultural. It is an ancient town, and formerly derived great importance from its abbey, the largest and most magnificent in Devonshire, founded 961, for the Benedictine order, by Ordgar, Earl of Devonshire, father of the infamous Elfrida, and endowed with many privileges—its abbot being a peer of parliament. At the dissolution it was bestowed on John, Lord Russell, whose descendant, the Duke of Bedford, still holds the property. A printing press, the second in England, was established in the abbey at a very early period. The refectory and abbey gateway still stand in good preservation. The

parish church is a handsome edifice, with a tower at the w. end, resting on arches under which there is a thoroughfare. At the breaking out of the civil war, Pym was member for Tavistock.—Pop. (1901), 4,728.

TAVOY, *tà-voy′:* chief town of a dist. in Tenasserim, Brit. Burmah; on the left bank of the Tavoy river, about 30 m. from its mouth, about 220 m. s. of Moulmein. The site is low, inclosed on three sides by rice-fields and on the fourth by the river. The houses are scarcely visible from the river—being nearly concealed by umbrageous trees, palms, plantains, jacks, cassias, and hundreds of flowering shrubs. There is a hospital, a large jail, and a roomy *zayat* or caravansary. The houses are raised from the ground on piles, and are of bamboo fastened with rattan and thatched with the leaf of the water-palm. Tavoy is remarkable for its grand annual buffalo-fight, continuing two days, during which eight pair of buffaloes are brought into the field. The rice-fields around Tavoy are prolific sources of malaria. Intermittent fevers and dysentery are the most frequent diseases; yet the climate is on the whole healthful. Tavoy exports rice, sugar, wood-oil, timber, and fruits. The anchorage for large ships is at Goodridge Plains, about 30 m. below the town. Pop. (1901) 22,371. The *District* of Tavoy has 7,150 sq.m.; pop. (1901) 109,131.

TAW, v. *taw* [AS. *tawian;* Low Ger. *tauen,* to taw or dress leather: Dut, *touwen,* to soften]: to dress (skins) by impregnating them with saline, oily, and other matters, instead of tanning them. TAW′ING, imp.: N. art or operation of preparing skins for white leather. TAWED, pp. *tawd:* ADJ. rendered like leather. TAWER, n. *taw′ėr,* one who taws. TAW′ERY, n. *-ĭ,* a place where skins are dressed by tawing.

TAW, n. *taw* [perhaps connected with TEE 2 (q.v.)]: a child's marble; a game of marbles, or the spot or line from which it is played.

TAWAS CITY, Mich.: village, county-seat of Iosco co.; on Tawas bay (an inlet of Lake Huron), at the mouth of the Tawas river, and on the Detroit and Mackinac railroad; about 66 m. n. of Bay City. It has a good harbor and steamer connection with many of the lake ports. It is in an agricultural and lumbering region, and nearby are large salt deposits. Its industries are connected chiefly with the manufacturing of lumber, and the shipment of salt, lumber, and farm products. There is one bank. Pop. 1,400.

TAWDRY, a. *taw′drĭ* [a corruption of *St. Awdry,* which in turn is a corruption of *St. Etheldrida,* the saint who founded Ely Cathedral: *St. Awdry's* Fair, held in the Isle of Ely and elsewhere, was noted for the gingerbread ornaments and laces sold in its booths]: vulgarly showy in dress; having an excess of showy ornaments arranged without taste. TAW′DRILY, ad. *-lĭ.* TAW′DRINESS, n. *-nĕs,* an excessive show of finery, mean and vulgar.

TAWI TAWI, *tä'wĕ tä'wĕ*, Philippines: (1) A group of islands of the Sulu Archipelago, forming the extreme southwestern part of the Philippines, consisting of 88 islands; area, 462 sq.m. Some of the islands, though chartered, are unnamed; the others are divided into three sub-groups or clusters: (*a*) the Cinapusan or Kinapusan cluster; (*b*) the Tawi Tawi cluster; and (*c*) the Laparan cluster. The larger islands are mountainous, but of moderate height; the valleys and plains are fertile, and covered with tropical vegetation. Rice, corn, hemp, and coffee are cultivated, but only for domestic use; the forest wealth is considerable, but is not of commercial value on account of lack of means of transportation. The chief industry is fishing, pearl fishing, and gathering of mother-of-pearl, etc. The islands are sparsely populated, and as many are very inaccessible, have been for many years the hiding places of pirates; the few settlements were mostly established by the Spaniards. Pop. 1,815 fighting men.

(2) The largest and name island of the Tawi Tawi group; length from n.e. to s.w., 35 m.; greatest width, 15 m.; area, 187 sq.m. It is mountainous, and of volcanic formation; they are three groups of two peaks each, one at the s. end, one at the n. end, and the third in the e. central part; greatest elevation, 1,941 ft. The soil is generally fertile, and the island well wooded; the chief industry, as in the rest of the group, is fishing. The chief settlement is Tatán, on the n.w. coast, on a small bay.

TAWNY, a. *tawn'ĭ* [F. *tanné*, tawny, dark—from *tan*, tan (see TAN)]: of a yellowish dark color, like that of tanned leather, or of persons browned by the sun. TAWN'INESS, n. *-nĕs*, the quality of being tawny.

TAWS, or TAWSE, n. plu. *tawz* [see TAW 1]: in *Scot.*, a leather strap cut into strips at one end, used as an instrument of punishment for children in schools.

TAX, n. *tăks* [F. *taxer*, to rate, to tax—from L. *taxārĕ*, to rate or value—from *tangĕrĕ, tactum*, to touch]: duty or rate imposed by government on property, the products of industry, incomes, and the like, to defray the expenses of government (see below); tribute; impost; burden; charge: in *OE.*, censure: V. to lay a rate or impost on; to assess or settle judicially, as a bill of costs; to exact from; to censure; to accuse, followed by *with*. TAXED, pp. *tăkst*. TAXER, n. *tăks'er*, one who taxes. TAXABLE, a. *-ă-bl*, that may be taxed, also coming into use in fiscal discussions as a noun, meaning a subject of taxation. TAXATION, n. *tăks-ā'shŭn*, act of laying on a rate or impost; the taxes imposed on a community by the government to defray its expenses; the revenue so raised (see TAX, below): in *OE.*, accusation; scandal. DIRECT TAXES, taxes paid directly to the tax gatherer by the individual upon whom the burden ultimately rests, in contradistinction to *indirect taxes* which are paid

primarily by persons who recover them, usually with an increment, from consumers in the prices of commodities (see under Indirect). TAX-GATHERER, collector of taxes. TAXATION OF COSTS (see below).—SYN. of 'tax, n.'; impost; assessment; duty; toll; contribution; tribute; rate; exaction; demand; custom; dues; charge; levy.

TAX: exaction of money from the individual citizens of a country to defray the expense of government, or for the uses of the state. The main points to be considered in levying a tax relate to its justice, to its productiveness, and to its expediency.

Taxes in the United States are levied by the general govt.; or by the states; or by the minor civil authorities —towns, counties, etc. Federal taxes are raised almost exclusively by means of customs duties; the exceptions being the stamp tax on spirituous and malt liquors, the license tax on the sale of liquors, the stamp tax on manufactures of tobacco, and the license tax on their sale. During the civil war, taxes were laid by congress on incomes, on proprietary medicines, on lucifer matches, on legal instruments, and on many other subject-matters. The U. S. constitution grants power to congress to impose taxes in every form, but requires that direct taxes (not including income taxes) be apportioned to the several states according to their respective populations, and that all duties, imposts, and excise taxes be uniform throughout the country.

The primary object of taxation is provision of means of conducting government; among secondary objects the chief is protection of domestic industry: see PROTECTIVE TARIFF, although municipal governments frequently resort to license taxers for purposes of police regulation, e.g., dog licenses, liquor licenses, etc. In levying taxes, the legislator– according to Adam Smith—should be governed by such maxims as these: (1) The subjects of every state ought to contribute toward the support of the government as nearly as possible in proportion to their respective abilities, i.e., in proportion to the revenue which they respectively enjoy under the protection of the state. This is held by some students of taxation to apply to the value of governmental privileges in contradistinction to the value of the personal earnings, since the former revenue and not the latter is in the truest sense 'enjoyed under the protection of the state.' In this point is involved the issue as to whether taxation should be in proportion to the *ability to pay* to government or *financial benefits received* from government. (2) The tax which each individual is bound to pay ought to be certain and not arbitrary. The time of payment, the manner of payment, the quantity to be paid, all ought to be clear and plain to the contributor and to every other person. (3) Every tax ought to be levied at the time or in the manner in which it is most likely to be convenient for the contributor to pay it. (4) Every tax ought to be so

contrived as both to take out and to keep out of the pockets of the people as little as possible beyond what it brings into the treasury of the state.—The foregoing maxims have received general approval among legists, except that, in the case of taxation of the revenues of individuals, a graduated income tax, rising as income rises, is now generally held to be more equitable than an even percentage tax on all incomes.—A tax is *direct* 'which is demanded from the very persons who it is intended or desired should pay it;' while *indirect* taxes are 'those which are demanded from one person in the expectation and intention that he shall indemnify himself at the expense of another' (John Stuart Mill).

The achievement of popular govt. in England is mainly the outcome of efforts to give to the people control of the public purse through the right of self-taxation. The constitutional doctrine thus created by the mother country was remembered by the American colonists when the British govt. sought to raise in the colonies a stamp duty and a customs duty on tea—a tyrannous attempt from the point of view of the British constitution, for 'taxation without representation is tyranny.'

How to make taxation productive is a vast and complicated practical science. The most ingenious devices to this end have often, in practice, met counteracting difficulties. It was supposed that indirect taxation—i.e., a duty levied on articles before they reach the consumer—must, in a civilized and orderly country, be almost inexhaustible. The governmental advantage of the system lay in the consideration that the burden of the tax did not excite popular clamor by falling directly or wholly on the person who paid it. Turgot, one of the wisest of financiers, called it the art of plucking the goose without making it cry. Income tax, house tax (except rented houses, dog tax, ad valorem land tax, and the like, are levied directly on the person on whom the burden ultimately falls; and if he do not pay, the amount will be taken by force. Tea duty, wine duty, and the like, on the other hand, are not levied on the consumer, though he has to pay them; they are levied on the importer, who has no interest or a slight interest against the tax, since he must charge it on the consumers with the usual business profit added. But this form of taxation is met by checks. If it is excessive, people will not buy the taxed article; and it has often been found that reducing the duty increases the revenue. An indirect tax on luxuries, especially on those liable to be used to vicious excess, has strong recommendations: in some cases it would be no great calamity should the tax throw the article nearly out of use. But then comes another check in the smuggler, whose influence may probably do more to corrupt and disorganize society than the free use of the article in which he deals. A tax on the necessaries of life, on bread or salt, cannot be evaded, as in the case of luxuries,

by abandonment of the use; therefore it is very productive, but it is also very oppressive. The tax on salt in France was one of the chief causes of the French revolution. The favorite condition among statesmen for the revenues of a country is when luxuries are so abundantly used by all classes that a small addition to their price is a slight burden, yet yields a large revenue.

In 1901-2 the internal revenue of the United States was $271,867,990, a decrease of about $35,000,000 due to repeal of war taxes; and the customs revenue was $254,-444,708, an increase of about $15,800,000. The principal sources of internal revenue were spirits $121,138,013, tobacco $51,937,925, fermented liquors $71,988,902, oleomargarine $2,944,492, special taxes $11,610,286, penalties $208,209.—In the state and territories the rate of tax for gen. purp. is liable to vary at dif. times, and ranged (1902) from 17.29 cts. in New Mex. to 90 cts. in Ariz. on each $1,000 of asses. valuation of real and personal prop. The rate in cities, towns, villages, etc., also various according to local financial necessities, and ranged (1902) from 76 cts. in Denver, Colo., and $1.00 Fort Wayne, Ind., and to $9.85 in Springfield, O., on each $100 of assessed valuation. Where there is a legislative prohibition against exceeding a specified rate, taxing-officers usually provide for any increase of revenue that may be needed by raising valuations, particularly on real estate already undervalued; hence it may be stated generally that the higher the valuation the lower the rate, and *vice versa.* Exemptions from taxation are matters of state enactment, and, accordingly, show wide differences. See CUSTOMS DUTIES; EXCISE; POST-OFFICE; STAMP; LAND-TAX; FINANCE.

TAX, SINGLE: an ad valorem tax on land sufficient for the total exemption of productive enterprise from taxation; or (which is the same thing) exclusively on economic rent, and designed to defray all the costs of government without resort to any other mode of raising public revenue: it resembles the *impôt unique* of the French economists Quesnay and Turgot in the 18th century, much as the modern locomotive resembles the ancient wheelbarrow, and is the remedy suggested by the American economist, Henry George, for the persistence of poverty with advancing powers of wealth production. In his work *Progress and Poverty* (1879), Henry George compares the system of the single tax with the requirements of equitable taxation as laid down by Adam Smith (see TAX), and argues that in his system alone are all those requirements fully met. His plan was to abolish all other taxes, gradually though not slowly, commensurately increasing the ad valorem tax on land until from that source alone all governmental expenses might be drawn. He reasoned that by the application of such a system the burden of taxation would be lifted from improvement, enterprise and thrift and be placed upon the

monopoly of land, which affords the fundamental opportunity for enterprise, thereby discouraging land monopoly while promoting business, increasing the demand for labor, augmenting wages and consequently abolishing involuntary poverty; that this burden would be lifted also from the agricultural districts where land is comparatively valueless, and would be transferred to towns and cities, where, as in New York, land has such an enormous value that the most costly and towering buildings are not so valuable as the bare land which they cover; that such is the case wherever civilization centres; and that the same social advance which by increasing public needs calls for larger public revenues, correspondingly, and even more than correspondingly, increases the value of land. He argued that this single tax offered the cheapest and in all respects the best mode of raising public revenues; that an ad valorem tax on land, being a tax on the value of land, is not a tax on land according to its area, but on an advantage accruing on specially desirable land; that while such tax would avoid all the waste, loss, and fraud of indirect taxes, it would avoid also the evasions and injustice that attend attempts to tax incomes of all kinds, and would be of all possible taxes that which might be most cheaply, certainly, and equitably obtained; that it could not be evaded, because land cannot be concealed or removed, and its value can be ascertained with greater ease and certainty than any other value; that the 'unearned increment' belongs to society itself as distinguished from its individual members; that the single tax would abolish all other taxes, and would in every way promote the cause of civilization. Mr. George, in his *Social Problems* (chap. xix.), thus briefly defines the purpose of the single tax, and sums up its chief expected results: 'All that is necessary to do is to abolish all other forms of taxation until the weight of taxation rests upon the value of land irrespective of improvements, and take the ground-rent for the public benefit. In this simple way, without increasing governmental machinery, but on the contrary greatly simplifying it, we could make land common property. And in doing this we could abolish all other taxation, and still have a great and steadily increasing surplus, a growing common fund, in the benefits of which all might share. . . Under this system no one could afford to hold land he was not using, and land not in use would be thrown open to those who wished to use it, at once relieving the labor market and giving an enormous stimulus to production and improvement.'

This theory of taxation has found favor with multitudes of men, many of whom declare their inability to see how it is to be brought into practical application. Students of the system, however, assert that nothing serious lies in the way of its practical application, except the selfish opposition of privileged interests. The process itself would be simple, they say, consisting merely in the

abolition of one tax after another which falls upon production, until real estate improvements are included in the exemption and the whole burden of taxation rests where only some of it rests now, namely, upon the value of land regardless of its improvements; in other words, that the process is merely one of extending exemptions under the existing system and not of creating a new system. There are two classes of single tax advocates: those who approve it as a device adapted to present conditions and habits of thought and life, of practically abolishing land monopoly, and those who support it as the best method of taxation, regardless of its effect upon land monopoly. See Henry George's works, and Thomas G. Shearman's *Natural Taxation.* In opposition see Seligman's *Principles of Taxation* and Walker's *Land and Its Rent.*

TAXA'TION OF COSTS: in American Law Practice: fixing the amount of money to be paid by the losing side in a suit, on account of expenses incurred by the opposite side. The jury is obliged to make separate assessment of 'costs' and 'damages.' If the costs assessed by the jury appear insufficient, the party to whom they are awarded may have an assessment made by the clerk of court of prothonotary.—In England, taxation of costs means checking or reviewing the charges made by attorneys or solicitors, and the taxation is made by a 'taxing-master' or a 'registrar;' for in Britain a solicitor's charges are regulated according to a standard set by the court. Every step in a suit has a certain value put on it by the court, and the business of the taxing-officer is to see that this standard is not transgressed. But the charges of a solicitor only (not of a barrister or pleader) are subject to revision by the taxing-master.

TAX'EL: see BADGER.

TAXICORNES, *tăks-ĭ-kawr'nēz:* widely distributed family of coleopterous insects, of section *Heteromera,* having the body generally square; thorax either concealing or receiving the head; antennæ short; legs adapted for running. Most of them are found in fungi and beneath the bark of trees.

TAXIDERMY, n. *tăks'ĭ-dĕr'mĭ* [Gr. *taxis,* an arranging; *derma,* a skin]: art of preparing and preserving skins of animals (with the fur, feathers, or scales) in their natural appearance. TAX'IDER'MIST, n. *-mĭst,* one skilful in preparing and preserving animals for display. TAX'IDER'MIC, a. *-mĭk,* pert. to.—*Taxidermy* is at once the most vexatious and most difficult of all the arts. It is no longer a question of filling out a skin, but rather of making a statue of a creature long since dead, which will exactly fit the skin of that particular creature, stand erect and pose as the counterpart of life. 'Taxidermy, the handmaid of zoology,' said Dr. J. A. Allen, 'has already become one of the fine arts, requiring the skill and

other qualities of both the sculptor and the painter, and capable of yielding results comparable with the masterpieces of either.' It is, however, one of the newest of the arts, and there is serious need of a well established school of taxidermy in connection with some one of our great museums. Prior to 1880, only one American museum (the National) maintained a corps of taxidermists, and the majority of the mounted birds and mammals which found their way into other American museums were mounted at Ward's Natural Science Establishment, by men from France and Germany. Methods were crude, and results were far below the standards attained a few years later. Much of the work produced prior to 1880 has since been either dismounted, and remounted, or else destroyed.

In 1880, March, at Ward's establishment in Rochester, N. Y., Messrs. Hornaday, Webster, Lucas, Martens, Bailly, Critchley, and Fraine organized the National Society of American Taxidermists, and seriously began the task of developing taxidermy up to the level of the fine arts. All jealousy and exclusiveness were swept aside, and the three competitive exhibitions that were held in Rochester, Boston, and New York, finally opened the eyes of scientific men and of the general public, also, to the possibilities of scholarly taxidermy, when properly encouraged and paid for. The upward impetus then gained has already carried American taxidermy beyond the original hopes of the founders of the society, and the museums of America are now being filled with mounted vertebrates that in large measure are not only of real educational value, but are also agreeable to the eye. No modern American museum is now complete without a well-equipped department of taxidermy, in charge of a chief taxidermist on a salary, which in 1880 would have been considered unattainable.

In a modern, high-class taxidermist, the first requisite is not a knowledge of methods in mounting, but the thorough education of the eye in animal forms and expressions. This must be secured by courses in drawing, modeling, carving, and painting. The skeletons and external muscles of animals must be well studied, the latter from life. Besides the making of numberless sketches from life, hundreds of live-animal photographs should be collected and arranged for reference. Casts of heads and special parts of dead animals are of great importance, and should be diligently collected. At all times must the natural history of the vertebrates be studied and kept in mind. When this preparatory work has been accomplished, the aspirant for taxidermic honors must secure admission to the laboratory of some master-taxidermist, and work with him to acquire a knowledge of methods.

A comparison of American with European taxidermy is of but passing interest, chiefly for the reason that without an international exhibition it is impossible to

draw parallels of positive value. From three inspections of European zoological museums, made in 1876, 1896, and 1902, it is the opinion of many that the best of American museum taxidermy is now decidedly in advance of the best to be found in Europe. The groups of mammals, great and small, that now are so intensely interesting to visitors in the museums of Washington, New York, Pittsburg, Chicago, Milwaukee, and at the University of Kansas, have no counterparts in Europe. The British Museum of Natural History, at South Kensington, contains a fine series of groups of birds, mounted with natural accessories. In the museum of the Amsterdam 'Natura Artis Magistra,' there are a number of excellent groups of birds. In the museums of the American cities mentioned above, the huge family groups representing the bison, moose, elk, caribou, musk-ox, deer, antelope, eland, zebra, and other animals, all provided with carefully-studied natural accessories, constitute enduring monuments to the skill of American taxidermists.

Of all museum officers who have actively promoted the development of American taxidermy, Prof. Spencer F. Baird and Dr. G. Brown Goode stand first. As early as 1880 they advocated the attainment of perfection in results, regardless of time or cost. It was by their consent and coöperation that the National Museum set the pace in the development of large groups of mammals, which really began in 1887 with the group of American bison. In this connection, honorable mention is due Prof. Henry A. Ward, founder of Ward's Natural Science Establishment, for the far-reaching influence exerted by him for the improvement of taxidermic methods generally, and the coöperation which he extended to the Society of American Taxidermists.

Among the leading artists should be mentioned Mr. Carl E. Akeley, of Chicago, who originated and is the acknowledged head of the present school of American taxidermists, using the 'plastic' method in the mounting of large animals. The development of the jointed manikin and the perfecting of the system of producing picture groups as well as numerous other contributions by him to the technique of the art has gone far, by reason of their speedy adoption by artists in the leading zoological museums, towards bringing about the revolution in method and practice generally that has elevated taxidermy to the dignified position it now holds among the arts.

With the improvements noted in museum taxidermy, equal advances have been made in the class of what is known as custom taxidermy. The number of trophy heads of large mammals that are now mounted annually in the United States cannot be less than about 1,800. About two-thirds are heads of deer, and the remainder consist of moose, mountain-sheep, caribou, elk, antelope, mountain-goat, buffalo, musk-ox, and bear, about in the order named. Twenty-five years ago a finely mounted

head was a rarity, but today, outside of the workshops of amateurs, a badly-mounted head is seldom seen. The standards of excellence have risen very greatly. The demands of patrons are more intelligent, and good work is better compensated than heretofore.

As the world's mammals, birds and other vertebrates decrease, museums multiply, and the desire to provide fine collections becomes more earnest and insistent. Taxidermy now offers a good field for a limited number of young men of real artistic instincts who can bring to it adequate education and training, and unlimited capacity for hard work.

Three important and recent American works on taxidermy should be remembered: Hornaday, *Taxidermy and Zoological Collecting* (1892); Davie, *Methods in the Art of Taxidermy* (1894); Rowley, *Art of Taxidermy* (1900).

TAXIN, n. *tăks'ĭn* [L. *taxus,* a yew-tree]: the resinous substance found in the leaves of the yew-tree.

TAXIS, n. *tăks'ĭs* [Gr. *taxis,* an arranging—from *tassō,* I arrange]: in *surg.,* replacing of parts which have left their natural situation, by the hand without instruments.

TAXOLOGY, n. *tăks-ŏl'ŏ-jĭ* [Gr. *taxis,* an arranging; *logos,* discourse]: the methods adopted for classifying various forms of animal life and plant life, and the laws regulating the variations of species, etc.; systematic botany; same as *taxonomy.* TAXOL'OGIST, n. *-ŏ-jĭst,* one skilled in.

TAXONOMY, n. *tăks-ŏn'ō-mĭ* [Gr. *taxis,* an arranging; *nomos,* law]: the department of natural history which treats of the laws and principles of classification. TAXON'OMIST, n. *-mĭst,* one skilled in these laws and principles of classification.

TAY, *tā:* longest river in Scotland, draining nearly the whole of Perthshire, and pouring into the German Ocean more water than any other British river. Its source is 553 ft. above sea-level; in the w. of the county of Perth, and in its earliest course it is known as the Dochart (some say the Fillan). The Dochart, the principal feeder of Loch Tay, rises in Ben Lui, on the borders of Argyleshire, and, flowing n.e., is joined by the Lochy, just before the united streams enter the loch. After leaving it, the Tay flows e.n.e., when, turning s., it passes, with a winding course, Dunkeld and Perth. About a mile below Perth, turning e.n.e. it widens at the mouth of the Earn into an estuary—the Firth of Tay, which varies from three-fourths of a mile to 3 m. in breadth, mostly between the counties of Fife and Forfar —and joins the German Ocean about 10 m. below Dundee. Its total length from the source of the Dochart to Perth is about 95 m., to which its estuary adds about 25 m.; and its basin comprises about 2,400 sq.m. The

scenery, especially in its middle course, is singularly picturesque. The salmon-fishings on the Tay and its tributaries are of considerable value. The tide flows to a mile above Perth; but the navigation up to Dundee is greatly impeded by shifting sand-banks. The railway bridge (1871-78) spanning the estuary near Dundee (nearly 2 m. long) fell during the crossing of a passenger train, in a great gale 1879, Dec. 28, with the loss of nearly 90 lives. A new bridge at lower elevation, begun 1882, was opened for general traffic 1887.

Loch Tay is a long and narrow lake, an expansion of the river Tay about 25 m. from its source; picturesquely situated in a basin scooped out of the bosom of the mountains, 355 ft. above sea-level; length about 15 m., average breadth 1 m., depth varying from 100 to 600 ft. Ben Lawers rises on its w. side. The loch is at times subject to violent and unaccountable agitations.

TAYABAS, *tâ-yâ'băs*, Philippines: (1) Pueblo province of Tayabas; on Tayabas river, 5 m. inland, 65 m. s.e. of Manila. Under Spanish jurisdiction it was the capital of the province, and is the largest town. It is an important road centre and carries on a large trade. Pop. 15,000. (2) Province, forming the western part of southern Luzon; bounded on the n. by the Pacific Ocean, and Lamón Bay and Ambos Camarines, on the e. by Ambos Camarines and the Visayan Sea, on the s. by the Mindoro Sea, and on the w. by Batangas and Laguna; area, 2,250 sq.m., with dependent islands 2,334 sq.m. The outline is very irregular; its extreme length from Point Piapi in the n.w. to Point Pagsanján in the s.e. is 102 m.; and the distance from the northeastern boundary to Sandoval Point on the s.w. is 47 m. Its coasts are indented by three of the largest bays of the Philippines, Lamón on the n., Ragay on the e., and Tayabas on the s. The province is generally mountainous, the main central chain extends from n.w. to s.e., and this range sends out spurs on each side. There are numerous small rivers and streams. The soil of the valleys is fertile; on the lower levels rice, sugar, and coffee are raised, and grain on the higher levels; a special product is a seed called lumbang from which an oil is made; the cocoanut is grown in large quantities. The forests contain a variety of woods for building purposes, besides gum and resin trees; and large quantities of timber and forest products are exported. The mechanical industries of this province are of considerable importance; the manufactures include hats, cigar cases, and boxes, and native fabrics; there are also mills for extracting cocoanut oil, and a number of boat-building yards for the construction of native boats. Stock-raising is also of some importance. The province has good communication by water with all parts of the Philippines, and it is traversed by the main highway from Sorsogón to Manila; there are also several other roads and trails. The inhabitants of the western part of the province are

Tagalogs, those of the eastern part are Bícols. Civil government was established in March, 1901, in accordance with the law of the Philippine Commission. Pop. (1901) 109,780.

TAYGETUS, *tâ-ĭj'ĕ-tŭs,* Greece: a mountain range running down the central peninsula of southern Morea. It is a steep and unbroken ridge rising in Hagios Elias to a height of 7,904 ft. It separated ancient Sparta from Messenia and was known in the Middle Ages as Pentedaktylon.

TAYLER, *tā'lĕr,* JOHN JAMES, D.D.: 1798-1869, May 28; b. Nottingham, Eng.: educator. He graduated at the Univ. of Glasgow 1818; was ordained a Unitarian minister at Manchester 1820; sec. of York College 1822-40, and after its removal to Manchester, professor of ecclesiastical history and of doctrinal theology; removed to London with the college 1855, and after its reorganization as Manchester New College became its principal. In 1868 he represented the English Unitarians at the tercentenary celebration of the denomination in Hungary. He also held a pastorate several years, and published many scholarly works.

TAYLOR, *tā'lĕr,* ALFRED: 1810, May 23—1891, Apr. 19; b. Fairfax co., Va.: naval officer. He entered the U. S. navy as midshipman 1825; was promoted passed midshipman 1831, lieutenant 1837, commander 1855 captain 1862, commodore 1866, and rear-admiral 1872 Jan. 29; and was retired 1872, May 23. During his naval career he was on sea-service 18 years 3 months, on shore or other duty 18 years 3 months, and was unemployed 29 years 6 months. He was in the blockade of Vera Cruz in the Mexican war, with Com. Perry on the Japan expedition 1853-55, and at the Boston navy-yard during most of the civil war.

TAY'LOR, BAYARD: author and traveller: 1825, Jan. 11—1878, Dec. 19; b. Kennett Square, Chester co., Pa. Having received a common-school education, he was apprenticed at the age of 17 in a printing-office, when he began his poetical contributions to periodicals. In 1844 he published *Ximena,* a volume of poems; and soon afterward started on a pedestrian tour of Europe, publishing 1846 *Views Afoot, or Europe Seen with a Knapsack and Staff.* After his return, he edited a country newspaper, then went to New York and wrote for the *Literary World* and *Tribune.* Of the latter he became asst. editor; and as its correspondent made extensive travels—in Cal. and Mex., recorded in *El Dorado, or Adventures in the Path of Empire* (1850); up the Nile to lat. 12° 30′ n., and in Asia Minor, Syria, across Asia to India, China, and Japan—recorded in *Journey to Central Africa, Lands of the Saracen,* and *Visit to India, China, Loo-Choo, and Japan* (1853). Later explorations are recorded in *Northern Travel, or Summer and Winter Pictures of Sweden, Denmark, and Lapland* (1858); and

Travels in Greece and Russia, with an Excursion to Crete (1857); *Travels in Greece and Rome* (1859); *At Home and Abroad* (1859-62); *Colorado* (1867); *Byways of Europe* (1869); *Travels in Arabia* (1872); *Egypt and Iceland* (1874). In 1862-3 he was connected with the U. S. embassy at St. Petersburg, and for a while had it in his sole charge; 1874 he visited Iceland. He resided some years in Germany, and 1878 was appointed U. S. minister at Berlin, where he died. Besides the works above noted, Taylor was author of *Rhymes of Travel, Ballads, and Other Poems* (1848); *Book of Romances, Lyrics, and Songs* (1851); *Poems of the Orient* (1854); *Poems of Home and Travel* (1855); *Hannah Thurston*, a novel (1863); *John Godfrey's Fortunes* (1864); *The Story of Kennett* (1866); *Joseph and His Friend* (1870); *Beauty and the Beast*, and *The Masque of the Gods* (1872); *The Prophet: a Tragedy* (1874); *Home Pastorals*, etc. (1875); *Prince Deukalion*, a drama (1878). In 1871 he published an admirable translation of *Faust*. See *Life and Letters* (2 vols. 1884).

TAYLOR, BENJAMIN FRANKLIN: American poet and journalist: b. Lowville, N. Y., 1819, Aug. 18; d. Cleveland, O., 1887, Feb. 24. He was educated at what is now Colgate University, Hamilton, N. Y., and in 1840 joined the staff of the Chicago *Evening Journal* as literary editor. He was war correspondent for that paper during the civil war and afterward traveled and lectured. He published: *January and June* (1853); *Pictures in Camp and Field* (1867); *Old-time Pictures and Sheaves of Rhyme* (1874); *Between the Gates* (1878); *Theophilus Trent* (1887); *Complete Poems* (1887); etc.

TAY'LOR, BROOK, LL.D.: one of the chief English mathematicians: 1685, Aug. 18—1731, Dec. 29; b. Edmonton, Middlesex; of a Puritan family of good position. He entered St. John's College, Cambridge, 1701, when mathematical science was the prominent pursuit among the learned; took his degree LL.B. 1709, became a fellow of the Royal Soc. 1712, and its sec. 1714. Though young, he had become, through his valuable treatises, widely known in Britain and on the continent for great proficiency in mathematics, and for power and versatility of mind. In 1716 he was received in Paris with warm regard by the French savants. On his return to England 1717, he resumed severe study. Taylor was married twice. Besides his earlier works, he contributed a series of able papers on higher algebra, dynamics, and general physics, published separately his *Methodus Incrementorum* 1715, and *Treatise on Linear Perspective*, the first general exposition of this subject, 1719. During the last ten years of his life, he was engaged in metaphysical and biblical studies. His manners were engaging, and he was socially a favorite. His *Methodus Incrementorum* contains, besides the famous 'theorem' (see TAYLOR'S THEOREM), the first germs of the calculus

of finite differences, various now common forms of infinitesimal series, with mechanical, physical, and algebraical applications. The effect of his demonstrations remained long unappreciated, till it was developed by writers of more lucid style. Some results of his investigations are in *Phil. Trans.* (1713-23).

TAYLOR, CHARLES HENRY: American journalist: b. Boston 1840, July 14. He made his start in life as a printer and reporter and was private secretary to the governor of Massachusetts for three years. He served during the civil war with the 38th Massachusetts regiment and was lieutenant-colonel on the staff of Gov. Claflin. He was member of the legislature in 1872 and in 1873 became manager and editor of the Boston *Daily Globe.*

TAYLOR, CHARLES JAY: American artist: b. New York 1865, Aug. 11. He was graduated at Columbia College Law School (1874) and subsequently studied art at the Art Students' League and in London and Paris. He has exhibited at the National Academy of Design; the Society of American Artists; the Pennsylvania Academy of Fine Arts; the Salon at Paris; the Chicago Institute; the World's Fair, Chicago; and the Exposition Universelle, Paris, 1900. He was awarded a medal at the Pan-American Exposition, 1901. His powers as an illustrator have been much appreciated and in addition to illustrating several books he has contributed cartoons to *Life, Puck, Judge, Punch,* and other serials.

TAYLOR, DAN: English Baptist church organizer: b. Northowram, Yorkshire, 1738, Dec. 21; d. London, 1816, Nov. 26. He joined the Wesleyans in 1759, and engaged as a preacher for them, but in 1762 withdrew his membership and became preacher of a Methodist secession at Wadsworth, West Riding, Yorkshire. In 1763 he entered the Lincolnshire Association of General Baptists, was ordained a Baptist preacher. His congregation is usually considered the first general Baptist church in Yorkshire, and in 1764 they erected the Birchcliffe meeting-house. He engaged extensively in evangelical work and from the first favored the 'new connexion' but did not formally leave the 'general assembly' until 1803. He became pastor of a church at Halifax in 1783 and in 1785 was appointed associate pastor at Church Lane, London, becoming sole pastor on the death of his colleague, John Brittain, in 1794. In 1798-1813, without relinquishing his pastoral duties, he was theological tutor at the General Baptist Evangelical Academy at Mile End. He published: *A Compendious View of Christian Baptism* (1772); *The Eternity of Future Punishment* (1789); *Memoirs of William Thompson* (1796); etc. Consult Adam Taylor, *Memoirs of Daniel Taylor* (1820).

TAYLOR, EDWARD THOMPSON: Methodist Episc. minister and seamen's chaplain: 1793, Dec. 25—1871, Apr. 6; b. Richmond, Va. Left an orphan, he was a

sailor-boy from his seventh year. In 1812, while on a privateer, he was made prisoner, and acted as chaplain for his fellow-prisoners while confined in England. He manifested remarkable natural gifts of eloquence, and was licensed to preach 1819 by the New England Meth. Episc. conference; and from 1828 until his death served laboriously and with wonderful success as chaplain of the Seamen's Bethel at Boston—becoming widely known as the eloquent 'Father Taylor,' and for his shrewd wit. He was chaplain of the *Macedonian*, the U. S. warship, sent loaded by private benevolence to relieve the famine in Ireland 1846-7; and he attracted notice by his addresses made there and in Scotland. The influence of his sympathetic nature and Christian earnestness was great with sailors; and, after a life of zealous usefulness, he died in Boston.

TAY'LOR, GEORGE: 1716-1781, Feb. 23; b. Ireland; signer of the Declaration of Independence. He received a liberal education, studied medicine, came to America as a redemptioner 1736, learned the iron-foundry business in Penn., and, marrying the widow of his employer, established large iron-works on the Lehigh river. In 1764 he was elected to the Penn. assembly, 1770 became co. court judge, 1775 went to the provincial assembly, and 1776, July 20, was elected to the continental congress to fill a vacancy, too late to vote for the declaration, but in time to sign it.

TAYLOR, HANNIS, LL.D.: American diplomatist: b. Newberne, N. C., 1851, Sept. 12. He was educated at the University of North Carolina and was minister to Spain 1893-7. He has been professor of constitutional and international law at Columbian (now George Washington) University since 1892, and was special counsel for the U. S. govt. before the Spanish Treaty Claims Commission. He has published *The Origin and Growth of the English Constitution; International Public Law*, etc.

TAYLOR, Sir HENRY, English poet and essayist: b. Bishop-Middleham, Durham, 1800, Oct. 18; d. 1886, Mar. 27. At 14 he entered the navy as midshipman, but returned after a few months. In 1817-20 he held a small appointment in London. Returning to his father's country home, he gave himself to serious study, and in 1822 wrote an article on Moore that was published in the *Quarterly Review*. He went to London, and in 1824 received a clerkship in the colonial office, with which he retained his connection for 48 years. He mingled with the intellectual life of the city, contributed to the *Quarterly Review*, and wrote his first tragedy, *Isaac Comnenus*, in 1827. It was favorably reviewed by Southey, but failed to attract popular notice. From 1828 to 1834 he was engaged upon another poetic drama, *Philip van Artevelde*, his principal achievement in literature. It was formed upon Elizabethan models, and its

style is marked by dignity and refinement. His other works include: *The Statesman* (1836), containing prose commentaries on official life and the conduct of business; *Edwin the Fair* (1842), a historical drama; *The Eve of the Conquest and other Poems* (1847); *Notes from Life* (1847); *The Virgin Widow*, a comedy afterward called *A Sicilian Summer* (1850); and *Saint Clement's Eve* (1862), a romantic drama. His autobiography was published in 1885.

TAY'LOR, Isaac: English philosophical and theological writer: 1787-1865, June 28; b. Lavenham, in Suffolk; the third of his name who attained distinction; so of Isaac Taylor of Ongar, a dissenting minister. Charles T., editor of *Calmet*, was his uncle; and Jane Taylor (1783-1824), author of *Q. Q. Papers* and Ann Taylor (Mrs. Gilbert of Nottingham) (1782-1866), joint-authors of *Hymns for Infant Minds*, were his sisters. His literary career began 1818, in contributions to the *Eclectic Review*, then conducted by Robert Hall and John Foster; and it ended 1865, in contributions to *Good Words*, accompanying those of men unborn when he was in the height of his reputation. Taylor became a member of the Established Church. 1822-27 he published *Elements of Thought; Characters of Theophrastus*, with illustrations, etched by himself (for he was an artist and engraver); *The History of the Transmission of Ancient Books to Modern Times; The Process of Historical Proof;* a translation of Herodotus; and *Memoirs and Correspondence of Jane Taylor*. In 1829 he published, anonymously, *The Natural History of Enthusiasm*, which ran rapidly through several editions; and 1829-36 he published *Fanaticism; Spiritual Despotism; Saturday Evening;* and *The Physical Theory of Another Life*. In 1836 appeared *Home Education*. Thereafter he was occupied on a new translation of Josephus, with the Rev. Dr. Traill. In his later years appeared *Loyola; Wesley; The Restoration of Belief; Logic of Theology; Ultimate Civilization;* and *The Spirit of Hebrew Poetry*. He wrote also many articles for the quarterly reviews. Taylor had a prolific and original mind, and several of his works (nearly all repub. in New York) commanded a very large circulation. He made many mechanical inventions, two of which revolutionized the art of calico-printing.

TAYLOR, Isaac: English scholar, son of the author of *The Natural History of Enthusiasm*: b. Stanford Rivers, Essex, 1829, May 2; d. Settrington, Yorkshire, 1901, Oct. 18. He was graduated from Trinity College, Cambridge, and in the following year issued a translation of Bekker's *Charicles*. He was ordained in 1857, and in 1860 published *The Liturgy and the Dissenters*. In the latter year he became a curate in London, and in 1864 published the first of the works by which he is chiefly remembered, *Words and Places, or Etymological Illus-*

trations of History, Ethnology, and Geography. In 1865-69 he held a curacy in a Bethnal Green parish, and his arduous labors there are described in *The Burden of the Poor.* He became vicar of Holy Trinity, Twickenham, in 1869, and in 1875 was presented to the rectory of Settrington, near Malton, in Yorkshire, which he retained till his death. In 1879 he first propounded the theory of the Greek origin of runes in a work entitled *Greeks and Goths: A Study on the Runes;* and he published in German a treatise *Ueber den Ursprung des glagolitischen Alphabets,* but his *magnum opus, The Alphabet: an Account of the Origin and Development of Letters,* did not appear till 1883. In 1885 he was appointed canon of York. His other works include: *The Family Pen: Memorials, Biographical and Literary, of the Taylors of Ongar* (1867); *Etrusean Researches* (1874); *Leaves from an Egyptian Note-Book* (1888); *The Origin of the Aryans* (1889); and *Names and their Histories: A Handbook of Historical Geography and Topographical Nomenclature* (1896).

TAYLOR, Isaac Ebenezer: American physician: b. Philadelphia 1812, Apr. 25; d. 1889, Oct. 30. He was graduated from Rutgers College in 1830, and in medicine from the University of Pennsylvania in 1834. He subsequently studied in Europe, settled in New York, and had charge of the department of women's diseases at the City, Eastern, Northern, and Demitt dispensaries, for seven years each. In 1851 he was elected physician to Bellevue hospital, where he initiated important reforms, secured the foundation of the hospital college, and became its head, 1861. He was subsequently president of the medical board of the hospital; attending physician and head of the medical board of the Charity hospital; and obstetrical physician to the Maternity hospital. He was the first American to introduce uterine auscultation, helped introduce the hypodermic method of treatment by morphia and strychnia, and was the earliest in this country to use the speculum in diseases of women and children. He published a monograph on this subject in 1841.

TAYLOR, James Munroe, D.D., LL.D.: American college president: b. Brooklyn, N. Y., 1848, Aug. 5. He was graduated from the University of Rochester in 1868, and was pastor of a Baptist church in South Norwalk, Conn., 1873-82, and at Providence, R. I., 1882-6. Since 1886 he has been professor of ethics and president of Vassar College. He has published: *Psychology* (1893); *New World and Old Gospel* (1900); *Practical or Ideal* (1901).

TAYLOR, Jane: English poet and author, daughter of Isaac Taylor, 1759-1829: b. London 1783, Sept. 23; d. Ongar, Essex, 1823, Apr. 12. She was educated under the supervision of her father and early displayed literary ability. Her work, which was very successful, bears some

similarity in thought to that of Cowper. Her first work was *The Beggar Boy* (1804) and in conjunction with her sister Ann (Mrs. Gilbert, of Nottingham, 1783-1824), she published: *Original Poems* and *Hymns for Infant Minds.* Her other work includes: *Display,* a didactic tale (1815); *Essays in Rhymes* (1816); and (published posthumously) *Contributions of Q. Q. to a Periodical* (1826); *Correspondence* (1825); etc.

TAYLOR, JEREMY: English prelate and author: b. Cambridge 1613; d. Lisburn, County Antrim, Ireland, 1667, Aug. 13. After graduation in 1630 from Caius College, Cambridge, he was ordained in 1634, attracted some attention by his divinity lectures at Saint Paul's and was sent by Laud to Oxford, where he was admitted perpetual fellow in 1636. He was presented to the rectory of Uppingham, Rutland, in 1638, to that of Overstone, Northamptonshire, in 1643. By this time he had made much of a reputation by his casuistical discourses. In the civil war he was committed to the Royalist party. As chaplain in ordinary to the king, he accompanied the army, and was taken prisoner by the Parliamentarians in the battle before Cardigan Castle (1645). Soon released, he remained in Wales, having found, as he later said, that the 'great storm' had 'dashed the vessel of the church all in pieces.' While chaplain to Richard Vaughan, Earl of Carbery, at Golden Grove, Carmarthenshire, he did some of his best literary work, including *The Liberty of Prophesying* (1646); *Holy Living* (1650); and *Holy Dying* (1651). He was twice imprisoned at Chepstow, occasionally preached to small Episcopalian congregations in London, and in 1658 was appointed to a weekly lectureship at Lisburn, County Antrim. In 1660, April, he signed the 'declaration' of the Loyalists, and in August following the Restoration was made bishop of Down and Connor. He found the diocese a troublesome one, owing to difficulties with the Presbyterian leaders, who refused to recognize episcopal jurisdiction. At his first visitation he declared 36 churches vacant, their incumbents not having been episcopally ordained. Contrary to his purpose, he contributed greatly toward the establishment of loyalist Presbyterians in n. Ireland as an independent ecclesiastical organization. Of his works, the best known is probably the *Liberty of Prophesying*—by which he meant expounding—a defense of toleration. He rests his plea for private judgment on the uncertainty and inadequacy of tradition, the fallibility of any arbiter that may be selected on points of controversy, and the difficulty of expounding the Scriptures. Coleridge thought the result of the argument was that 'so much can be said for every opinion and sect' that appeal must be made to 'some positive jurisdiction on earth.' Perhaps Taylor's was merely a 'legal settlement.' At any rate, it is otherwise inconsistent with his procedure in Ireland. But he was at his best not as an accurate theologian or

polemic but as a preacher of righteousness. His literary genius is generally thought to be seen to best advantage in his sermons. They do not lack rhetorical faults—redundancy, diffuseness, a burdensome extent of quotation and illustration; but they are always eloquent, with a certain vividness, dignity, and solidity for which many critics have been unable to find an equal in English prose. His devotional works, inspiring for their deep piety, are also highly valued for their usefulness. Next to the 'Liberty of Prophesying' they are most famous among Taylor's writings, and now the most widely read. There are collected editions by Bishop Heber (1820-2) and by Eden (1847-54). Consult: Coleridge's *Literary Remains;* Hunt, *Religious Thought in England* (1870); Tulloch, *Rational Theology* (1872); Barry, *Classic Preachers* (1878); Dowden, *Puritan and Anglican* (1901); *Life* by Heber (1822), revised by Eden (1854); Gosse, *Jeremy Taylor* (1904).

TAYLOR, JOHN: English poet: b. Gloucestershire 1580, Aug. 24; d. London 1654, July 25. When young he was taken to London and apprenticed to a waterman, hence the title of 'water-poet,' by which he is commonly known. He was at the taking of Cadiz, under the Earl of Essex, in 1596, and afterward visited Germany and Scotland. At home he was many years collector for the lieutenant of the Tower of London of his fees of the wines from all the ships which brought them up the Thames. When the civil war broke out he retired to Oxford, where he kept a common victualing house; and wrote pasquinades upon the Roundheads. He afterward kept a public house at Westminster. Certain of his works are published under the title *All the Works of John Taylor, the Water-Poet, being Sixty and Three in Number, collected into one volume by the author, with sundry new Additions, corrected, revised, and newly imprinted* (1630). His pieces were subsequently increased to more than double that number. They are not destitute of natural humor, and of the jingling wit which prevailed so much during the reign of James I. As a mirror of the coarse manners of his times they are invaluable to the historian and antiquary.

TAYLOR, JOHN: Mormon president: b. Milnthrop, Westmoreland co., England, 1808, Nov. 1; d. Salt Lake City, Utah, 1887, July 25. He was born of parents professing the faith of the Church of England, but while a youth became a Methodist local preacher. In 1832 he emigrated to Canada and in 1835 was converted to the Mormon faith during the missionary tour of Porley P. Pratt. He was ordained a high priest by Joseph Smith in 1837 and in 1840 went as a Mormon missionary to various parts of the British Isles. The following year he returned and settled at Nauvoo, Ill., where in 1844, in company with several other Mormon leaders, charges of

sedition and disloyalty were brought against him. The Carthage jail, where the prisoners were confined, was attacked by a mob, two of his companions were killed, and he was severely wounded. Returning from a second mission to England in 1846 he went to the new Mormon settlement in Salt Lake City, and in 1849 was elected an associate judge of the Mormon State of Deseret. He subsequently translated and published the *Book of Mormon* in French and German. In 1854 he was elected a member of the legislative council, and the next year began a mission in New York, published *The Mormon*, and took charge of Mormon followers in the e. From 1877 to 1880 he was president of the Twelve Apostles, and in the latter year organized the first presidency of the Church anew, and took the chief place himself. In 1885, March, he was among those indicted by a federal grand jury under the Edmunds law; but remained in concealment until his death.

TAYLOR, NATHANIEL WILLIAM: American Congregational clergyman: b. New Milford, Conn., 1786, June 23; d. New Haven, Conn., 1858, Mar. 10. He was graduated at Yale in 1807, and five years later became the pastor of the First Congregational Church at New Haven, in which position he continued until 1822, when he resigned to become professor of theology at Yale. This chair he held during the remainder of his life. He maintained the 'New Haven theology,' and especially on the doctrine of total depravity, which was regarded as heretical, led him into a controversy with the less liberal branch of the Congregational Church in 1828-30. His works were edited and published by Noah Porter (1858-9).

TAY'LOR, RICHARD: military officer: 1826, Jan. 27—1879, Apr. 12; b. New Orleans; only son of Pres. Zachary Taylor. He graduated at Yale 1845; was in the Mexican war with his father; and then lived on a Louisiana sugar estate till the civil war. He entered the Confederate army as colonel of a Louisiana regiment; attained the rank of lieutenant general; was at the first Bull Run, and with 'Stonewall' Jackson in Virginia; defeated Gen. Banks in his Red River campaign; and surrendered to Gen. Canby 1865, May 4. After the war he engaged in politics, and published *Destruction and Reconstruction* (1879).

TAYLOR, ROWLAND: English martyr: b. Rothbury, Northumberland; d. Hadleigh, Suffolk 1555. He was graduated at Cambridge University and appointed by Cranmer, to whom he was domestic chaplain, rector of Hadleigh, and he became archdeacon of Exeter and a canon of Rochester. Under Mary he was imprisoned as a heretic for more than a twelvemonth and on being condemned to the stake suffered at Hadleigh. Consult Cooper, *Athenæ Cantabrigienses* (1858).

TAY'LOR, SAMUEL HARVEY, LL.D.: eminent teacher:

1807, Oct. 3—1871, Jan. 29; b. Derry, N. H. He graduated at Dartmouth College 1832, and Andover Theological Seminary 1837, became that year principal of Phillips Academy, and retaining the position till his death. He was noted in classical studies, and gave the Andover academy wide reputation for thorough study. He was associate editor of the *Bibliotheca Sacra;* translated German text-books on Greek and Latin philology; published *Method of Classical Study* (1861); and compiled a volume of extracts on the value of such study, *Classical Study* (1870). He died in Andover.

TAYLOR, Tom: English dramatist and journalist: b. Bishop-Wearmouth (Sunderland) 1817, Oct. 19; d. Wandsworth 1880, July 12. He was educated at the University of Glasgow, and at Trinity College, Cambridge, graduating from the latter in 1840. He was elected a fellow of his college in 1842, and in 1845-7 he was professor of the English language and literature in University College, London. Called to the bar in 1846, he was on the n. circuit for a time, but in 1850 was appointed assistant secretary, in 1854 secretary, to the board of health. On the formation of the local govt. board he was made secretary of the sanitary department, and when his post was abolished in 1871 he retired with a pension. He engaged in journalistic work at an early stage in his career, and in 1844 began his connection with *Punch,* which continued until his death; in 1874 he succeeded Shirley Brooks as editor. He was the author of a large number of successful plays, including *To Parents and Guardians* (1845); *Masks and Faces* (1852), in collaboration with Charles Reade; *To Oblige Benson* (1854), an adaptation from the French; *Our American Cousin* (1858), first produced at Laura Keane's theatre, New York, when Sothern created the character of Lord Dundreary; *New Men and Old Acres* (1859), partly by A. W. Dubourg; *The Overland Route* (1860); *The Ticket-of-Leave Man* (1863), based upon a French work; *The Fool's Revenge* (1869), based upon Hugo's *Le Roi S'Amuse; Twixt Axe and Crown* (1870), adapted from the German; *Joan of Arc* (1871); *Lady Clancarty* (1874); and *Settling Day* (1877). At the time of the death of Lincoln he wrote a poem at once in eulogy of the martyr and in 'atonement of Mr. Punch.'

TAY'LOR, William, D.D.: Methodist Episc. missionary bishop: b. Rockbridge co., Va., 1821, May 2; d. Palo Alto, Cal. 1902. He graduated from a farm; became itinerant preacher 1843-49; missionary to California 1849-56; evangelist in the e. states and Canada 1856-62, after which he labored in Great Britain, Australia, Tasmania, New Zealand, s. Africa (converting many Kafirs), Ceylon, India, Central America, Brazil, Chili, and Peru. In 1872 he established an independent mission in Bombay on the principle of self-support, which resulted in form-

ing the South India and the Madras conferences, embracing missions in a number of important centres. In Central and S. America, similar stations have been founded. In 1884 he was elected missionary bishop of Africa, and established 36 missions, extending 1,200 m. on the Congo and 390 m. on the w. coast, including 70 missionaries supported by Methodists in America until rendered independent by school farms.—Bishop Taylor was author of *California Life Illustrated* (1858); *The Model Preacher* (1860); *Reconciliation, or How to Be Saved* (1867); *Infancy and Manhood of Christian Life;* and *Christian Adventures in S. Africa* (1867); *The Election of Grace* (1868); *Four Years' Campaign in India* (1875); *Our S. American Cousins* (1878); *Letters to a Quaker on Baptism* (1882); *Four Years of Self-supporting Missions in India* (1882); *Pauline Methods of Missionary Work* (1889).

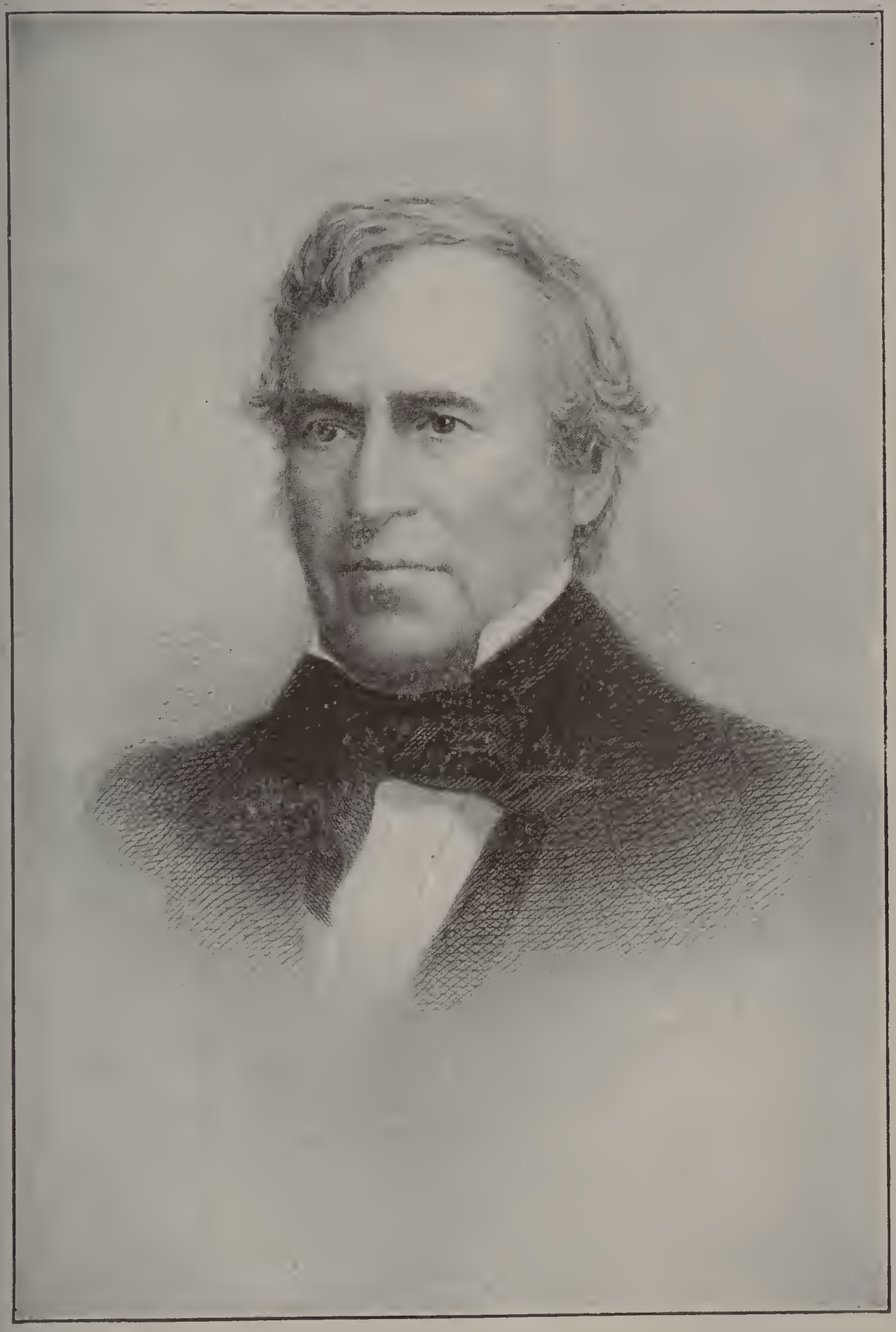
TAY'LOR, WILLIAM JAMES ROMEYN, D.D.: clergyman of the Reformed Church: 1823, July 31—1891, Nov. 12: b. Schodack, N. Y. He graduated at Rutgers College 1841, and New Brunswick Theological Seminary 1844; was pastor of various important churches of the Reformed denomination. He was also for a time corresponding secretary of the American Bible Society. He was editor of the *Christian Intelligencer* 1872-76. He published *The Bible in the Last Hundred Years* (1876); *Church Extension in Large Cities* (1880); and *Co-operation in Foreign Missions* (1884).

TAY'LOR, WILLIAM MACKERGO, D.D., LL.D.: Congregational minister: 1829, Oct. 23—1895, Feb. 8: b. Kilmarnock, Scotland. He graduated at the University of Glasgow 1849, and at the United Presbyterian Theological Seminary, Edinburgh, 1852. After two years' pastorate at Kilmaurs, near his birthplace, he began a new Presbyterian church enterprise on Derby Road, Liverpool, 1855, and made it successful. On a visit to the United States 1871, he supplied the pulpit of the Church of the Pilgrims, Brooklyn, and accepted a call to Broadway Tabernacle Church (Congl.) 1872, where he ministered to a great congregation. He was regarded as a model of what is called distinctively a sermonizer, presenting carefully arranged thought in lucid and forceful diction, and with touches of dramatic power. He edited *The Christian at Work* 1876-80, and his publications include: *Life Truths* (1862); *The Miracles, Helps to Faith* (1865); *The Lost Found and the Wanderer Restored* (1870); *Prayer and Business* (1873); *David, King of Israel* (1875); *Elijah, the Prophet* (1876); *The Ministry of the Word*, Yale lectures (1876); *Songs in the Night* (1877); *Peter, the Apostle* (1877); *Daniel, the Beloved* (1878); *Moses, the Lawgiver* (1879); *The Gospel Miracles in Their Relation to Christianity*, Princeton lectures (1880); *The Limitations of Life*, sermons (1880); *Paul*

the Missionary (1882); *Contrary Winds,* sermons (1883); *Jesus at the Well* (1884); *John Knox,* a biography (1885); *Joseph, the Prime Minister* (1886); *The Parables of Our Saviour* (1886); *The Scottish Pulpit* (1887); *Ruth, the Gleaner, and Esther, the Queen* (1891).

TAY'LOR, WILLIAM ROGERS: naval officer: 1811, Nov. 7—1889, Apr. 14; b. Newport: son of Capt. William V. T., U.S.N. He entered the U. S. navy as midshipman 1828; was promoted passed midshipman 1834, lieut. 1840, commander 1855, capt. 1862, commodore 1866, and rear-admiral 1871, Jan. 19; and was retired 1873, Nov. 7. He distinguished himself in the Mexican and civil wars, was fleet-capt. during the attacks on Morris Island, was active in both attacks on Fort Fisher, and commanded the northern squadron of the Pacific fleet 1869-71 and the s. Atlantic squadron 1872-3.

TAY'LOR, ZACHARY: twelfth president of the United States; 1784, Nov. 24—1850, July 9 (pres. 1849-50); b. in Orange co., Va.; son of Col. Richard Taylor, officer of the war of the revolution, and one of the first settlers of Louisville, Ky. To Louisville Taylor was taken in early childhood, and grew up to his 24th year, working on a plantation, with only the simplest rudiments of education. His elder brother had received a lieutenancy in the army, and died 1808, whereupon Taylor was appointed to the vacant commission. In 1810 he was promoted to a captaincy; and 1812, with 50 men, two-thirds of whom were ill with fever, he defended Fort Harrison, on the Wabash, against a large force of Indians, led by the famous chief Tecumseh. Promoted to major for his gallantry, he was employed during the war in fighting the Indian allies of Great Britain. In 1822 he built Fort Jesup; 1832 he served as colonel in the Black Hawk war; and 1836 was ordered to Florida, where he gained an important victory over the Seminole Indians at Okechobee, for which he was appointed brigadier-general, and made commander of the U. S. forces in Florida. In 1840, having been appointed to command the s.w. dept., he bought an estate at Baton Rouge, La. 1845, Mar. 1, congress passed the resolution for the annexation of Texas, formerly a province of Mexico, and for some time an independent republic. Texas claimed the Rio Grande for her s.w. boundary; Mexico insisted that there could be no claim beyond the Nueces, and prepared to defend the disputed territory, if she could not reconquer the whole of Texas. Gen. Taylor was ordered to Corpus Christi, which he occupied in Nov. with a force of 4,000. 1846, Mar. 8, he moved toward the Rio Grande, across the disputed territory, and built Fort Brown, opposite and commanding the Mexican port of Matamoras. Gen. Ampudia, Mexican commander, demanded that he should retire beyond the Nueces, pending negotiations; and on the refusal of Gen. Taylor, Ampudia's successor, Gen.



ZACHARY TAYLOR.

Arista, crossed the Rio Grande with a force of 6,000. May 8 he was defeated at Palo Alto by Gen. Taylor, with a force of 2,300; and a few days afterward was driven from a new position at Resaca de la Palma across the Rio Grande. War was declared by congress to exist by the act of Mexico; 50,000 volunteers were called for, Taylor made major-general, reinforced and ordered to invade Mexico. Sep. 9, with 6,625 men, he attacked Monterey, which was defended by about 10,000 regular troops. After 10 days' siege and 3 days' hard fighting it capitulated. Gen. Scott, having been ordered to advance on the City of Mexico by Vera Cruz, withdrew a portion of the troops of General Taylor, leaving him only 5,000 volunteers and 500 regulars, chiefly flying artillery, to meet an army of 21,000, commanded by President Santa Anna. Taylor took a strong position at Buena Vista, fought a desperate battle, and won a decided victory. This victory against enormous odds excited the utmost enthusiasm, and Gen. Taylor, popularly called 'Old Rough and Ready,' was nominated by the whigs for president of the United States over Henry Clay, Daniel Webster, and Gen. Scott; and this 'ignorant frontier colonel, who had not voted for 40 years, and was a slaveholder, was triumphantly elected over Gen. Cass, the democratic, and Martin Van Buren and Charles Francis Adams, free-soil candidates. Entering on the presidency 1849, he found a democratic majority in congress, with a small but vigorous free-soil party holding the balance of power, while the most exciting questions connected with the extension of slavery, as the admission of California, the settlement of the boundaries of Texas, the organization of the newly acquired Mexican territories, etc., were agitating the country, and threatening a disruption of the Union, postponed by the compromises introduced by Henry Clay. Worn down by the unaccustomed turmoil of politics, the rough, good-natured old soldier succumbed to an attack of bilious colic; and, after five days' sickness, died, 16 months after his inauguration.

TAYLOR, Texas: town in Williamson co.; on the Missouri, Kansas and Texas and the International and Great Northern railroads; about 40 m. n.e. of Austin, the capital of the state. It is an agricultural and stock-raising section. The chief manufacturing establishments are cottonseed-oil mills, cotton-compresses, railroad shops, flour and planing mills. In 1900 there were 72 manufacturing establishments, which employed 207 persons. The value of the annual output was $429,955. There are large shipments of grain, vegetable, cotton products, fruit, and live-stock. The two national banks have a combined capital of $250,000. Pop. (1900) 4,211; (1910) 5,314.

TAYLOR INSTITUTION, Oxford, England: connected with the university, is designed mainly for the promotion of the study of modern European languages.

It owes its foundation to a bequest of Sir Robert Taylor. The building belonging to it was erected in 1848. The institution comprises four teacherships of modern European languages and a library, and there are in connection with it a scholarship and an exhibition. It is under the management of nine curators, all of whom must be members of convocation. The library is open free to all members of the university, and other literary persons may be admitted by special permission. The curators of the institution have also the administration of a fund bequeathed by William Thomas Horner for the encouragement of the study of the Polish and other Slavonic languages.

TAYLOR UNIVERSITY: located at Upland, Ind. The forerunner of the university was the Fort Wayne Female College organized in 1846 at Fort Wayne, Ind.; in 1852 this college united with the Collegiate Institute at the same place, and became a coeducational school. The name was changed to Taylor University in 1890; and in 1893 a new charter was obtained; and the university was moved to its present site, the citizens of Upland donating 10 acres of ground valued at $10,000. It is under the control of the National Association of Local Preachers of the Methodist Episcopal Church. It was named for Bishop Taylor, the first Methodist missionary bishop to Africa, who had a part in the organization. The departments of the University are the preparatory department, the Wright College of Liberal Arts, the Reade Theological Seminary, the normal department, the commercial department, and the Music department. The college offers four courses, classical, scientific, philosophical and literary, leading respectively to the degrees of A.B., B.S., PH.B, and B.L. A part of the work in the junior and senior years of each course is elective. The theological school offers two courses for undergraduates, the English and the classical (with Latin or Greek) and a full professional course for college graduates leading to the degree of A.B. The normal course is three years in length; the commercial department offers two courses in bookkeeping and shorthand, each one year in length, which may be combined in a two years' course. The spirit of the college is markedly religious, a number of graduates every year become missionaries; and the students' religious organizations are strong. The library contains 6,000 volumes; the students number 177, and the faculty 17.

TAYLOR'S THEOREM (named from its discoverer, Dr. Brook Taylor—q.v.): a general method for the algebraic development of a function of a quantity, x, in powers of its increment, h, and may be thus explained and illustrated. Let $f(x+h)$ denote *any* function of $x+h$ (subject to the limitations below); then $f(x+h) = f(x) + f'(x)h + f''(x)\frac{h^2}{1.2} + f'''(x)\frac{h^3}{1.2.3} + \ldots$, where $f(x)$ is

ZACHARY TAYLOR AT THE BATTLE OF O-KE-CHO-BEE, FLORIDA, IN 1836.

the same function of x as $f(x+h)$ is of $x+h$, and $f'(x)$, $f''(x)$, etc., are the first, second, etc., differential coefficients of $(f)x$. By a supplementary theorem, due to Lagrange, the first to appreciate the value of Taylor's discovery, it was shown that the sum of all the terms of the series after n terms could be represented by $f(x+\theta h)\frac{hn}{1.2...n}$, where θ is some positive fraction less than unity. The theorem supposes that between certain limits, indicated by $h=o$, and $h=$ some finite quantity, neither $f(x)$ nor any of its derived functions vanish, or all of them do not become infinite; and the cases in which these conditions are not satisfied are often spoken of as instances of the 'failure of Taylor's theorem.' An important particular case of this theorem, known as *Maclaurin's* or (more properly) *Stirling's Theorem*, was independently discovered; it is that case of the general theorem in which the various functions of x are made functions of zero, and is written $f(o+h)=f(o)+f'(o)h+f''(o)\frac{h^2}{1.2}+$, etc. The best illustrations of these theorems are the binomial, exponential, logarithmic, and circular series: thus, if the function be $(x+h)^n$, then $f(x)=x^n$, $f'(x)=nx^{n-1}$, $f''(x)=n(n-1)x^{n-2}$, etc.; and by substitution of these values we obtain Newton's *binomial* theorem; if the function be a^{x+h}, Taylor's series gives us as its equivalent $a^x(1+h\,.\log.\,a+\frac{h^2}{1.2}(\log.\,a)^2+\ldots.)$; and Maclaurin's gives $a^h=1+h\,.\log.\,a+\frac{h^2}{1.2}(\log.\,a)^2+\ldots.$, which latter is the *exponential* theorem, and may be obtained from Taylor's series by division; if the function be $\log.\,(1+x+h)$, ($\log.\,x+h$ being one of the cases in which Taylor's theorem fails), then Maclaurin's series gives the *logarithmic* theorem, $\log.\,(1+h)=h-\frac{h^2}{2}+\frac{h^3}{3},-$, etc.; and the same theorem gives the various series expressing the values of sin. h, cos. h, sin. ^{-1}h, etc., etc. The history of this celebrated theorem is remarkable. On the first publication of the *Methodus Incrementorum*, it was entirely neglected by Leibnitz. The theorem never appeared in any of the works on the calculus published before D'Alembert's *Recherches*, and after that it was given only in the French *Encyclopædia;* but neither D'Alembert nor Condorcet seems to have known that it was Taylor's, or to have appreciated its importance; and it was not till Lagrange, in *Berlin Memoirs*, 1772, gave the name of its author, and proposed to make it the foundation of the differential calculus, that it assumed the important position which was its right.

TAY'LORVILLE, Ill.: city, county-seat of Christian co.; on the South Fork of the Sangamon river, and on the Wabash and the Baltimore and Ohio Southwestern railroads; about 24 m. s.e. of Springfield and 27 m. s.w. of Decatur. It is in an agricultural and coal mining region, and has considerable manufacturing interests. The government census of 1900 gives the number of manufactories 60; the capital invested, $229,598; the value of the products, annually, $281,762. The chief shipments are coal, hay, live-stock, and manufactures. There are eight churches, a high school, graded schools, and a public library. There are three banks, one national with a capital of $80,000, and two private banks. Pop. (1900) 4,248; (1910) 5,446.

TAYRA, *tī-ra:* a brown, elongated, weasel-like fur-bearer (*Galictis barbera*) of Mexico and South America, which sometimes gathers in large bands. It has a long bushy tail.

TAYTAY, *tī-tī'*, Philippines: (1) Pueblo, province of Paragua, island of Palawan; on the n.e. coast on Taytay Bay. It is the chief town of the province and is protected by a fort mounting several guns and capable of accommodating a garrison of 700. Agriculture and fishing are the chief industries. Pop. (estimated) 7,420. (2) Pueblo, province of Rizal, Luzon, 10 m. e. of Manila. Pop. 6,800.

TAYUG, *tä-yoog'*, Philippines: pueblo, province of Pangasinán, Luzon; in the extreme n.e. of the province, near the Agno river; 34 m. e. of Lingayen. It is on the highway from San Quintin to Aseñgan. Pop. 19,612.

TAZEWELL, *tăz'wĕl*, HENRY: 1753-1799, Jan. 24; b. Brunswick co., Va.: jurist. He was educated at William and Mary College; admitted to the bar; member of the house of burgesses 1775-85; elected judge of the supreme court 1785, and judge of the court of appeals 1793; and was United States senator from 1794 till his death, being president of the senate 1795. He led the republican opposition to Jay's English treaty, and urged the abolition in Virginia of the laws of primogeniture and entail.

TAZZA, n. *tât'ză* [It.]: an ornamental cup or vase having a foot and handles and a large flat top

T-BANDAGE, n. *tē'bănd-ĭj:* surgical bandage shaped like a T, and consisting of a strip of linen attached to another strip at right angles; used in supporting dressings in diseases of the perinæum, groin, etc.

TCHAD, *chäd,* or CHAD, Africa: a large lake in the Sudan, situated around the common boundary point of Kamerun, British Nigeria and French Sahara, lat. 13° n. and long. 14° e. Its area during the rainy season is about 30,000 sq.m., but in the dry season it shrinks to less than 7,000 sq.m., and is then surrounded by vast marshes, while the remaining water is very shallow. The

water is fresh, although the lake has no apparent outlet; it is believed to discharge through subterranean channels. The eastern half is full of islands densely populated by negro tribes.

TCHAIKOVSKY, *chī'kōf'shē*, PETER ILICH, MUS.DOC.: greatest of Russian composers: b. Votinsk, government of Viatka, 1840, May 7; d. St. Petersburg 1893, Nov. 6, of cholera. His father, a mining engineer, had no intention of making a musician of him, but had him educated at the Technological Institute in St. Petersburg, after leaving which he obtained a post in the ministry of justice. But Peter was a gifted amateur, whose playing in social circles was much appreciated. Shortly thereafter he entered the conservatory, where he attracted the attention of Anton Rubinstein, who relates that once he gave the young man a theme and asked him to write a set of variations on it. He expected about a dozen, but Tchaikovsky brought him over 200. From Rubinstein he also took lessons in orchestration; the instruments on which he practiced were the piano and the organ; also the flute, of which he afterward made such admirable use in his *Nutcracker Suite* and other works. His worldly prospects steadily improved, and in 1877 he married, to the surprise of his friends. The union was not a happy one, and the pair soon separated. The composer was so despondent that he attempted to commit suicide in such a way as to avoid scandal by standing up to his chest in the icy river, in the hope of catching a deadly cold. In the following year another woman influenced his life, in a happier way. He did not know her, and she preferred to keep her identity concealed, but she put aside for his benefit a sum of money which made it possible for him to give up his conservatory classes and save his energy for his creative work.

In May, 1891, he visited America and gave concerts in New York and other cities. Two years later he conducted some of his works at Oxford and received the degree of doctor of music from the university. In the autumn of 1893 the world was startled by the news of his death. He succumbed to an attack of cholera, after a short illness. There were rumors of his having committed suicide, but his friend and biographer Kashkin discountenances them.

Like Beethoven, Tchaikovsky is greatest in his orchestral works, which include, beside the six symphonies, seven symphonic poems: *The Tempest; Francesca da Rimini; Manfred; Romeo and Juliet; Hamlet; Fatum; Le Voyevode.* In these, which contain some of his best and most mature music, he manifests his sympathy with Liszt and modern programme music. Among his other orchestral works the three that have become most famous are the *1812* overture, the *Marche Slave*, and the *Nutcracker Suite*, which contains the best musical numbers of one of his three ballets. His 11 operas are much less

modern in spirit and structure than his symphonic works, and the only one of them that has attracted much attention outside of Russia is the fourth, *Eugene Onegin.* There is much beautiful melody also in some of his 100 lyric songs; the best-known of them are the *Spanish Serenade, None But a Lonely Heart, Why So Pale Are the Roses.* Not a few of the songs are pot-boilers, and the same is true of many of his pianoforte pieces, the best of which, however, deserve to be better known. Pianists neglect them because of their awkward technique. Three pianoforte concertos, a violin concerto, a string sextet, and other pieces of chamber music must be added to the list of his compositions. His work as a whole is characterized by a remarkable variety; now it is classical, even old-fashioned, now ultra-modern; now Russian, now cosmopolitan. The authoritative life of Tchaikovsky has been written by his brother Modest. A shorter volume (in English) by Rosa Newmarch includes extracts from his critical writings and diaries. Consult also: Kashkin, *Reminiscences;* Huneker, *Mezzotints in Modern Music;* Riemann, *Geschichte der Musik seit Beethoven.* A *Catalogue Thematique* of the compositions is issued by Jurgenson, Moscow.

TCHELYUSKIN, *chĕl-yûs'kĭn,* CAPE, formerly CAPE SEVERO; northernmost point of Asia. It was rounded by Nordenskjöld and his party 1878, and found by them to be in lat. 77° 41′ north.

TCHEREMISSES, *chĕr'ĕ-mĭs-ĕs:* branch of the Finnish race (see FINNS), inhabiting the country between the Volga and the Viatka in Russia, also the region of the Kama and the Bielaja; distributed in the governments Kazan, Kostroma, and Viatka. Prof. Smirnoff, of Kazan University, computes their number at 321,-591. Their country is in two distinct regions—the 'mountain land' stretching from Vassilssursk on the w. to Hyinka on the e., and the much more extensive 'meadow land' bounded w. by the Vetluga, Yuronga, and Usta, n. by the Viatka, e. by the Ilet, s. by the Volga and lower Kama. The mountain land is well clothed with pine and fir, and has very fertile soil; its people are noted for fine and vigorous physique. The meadow land is still mostly covered with forests, and its inhabitants subsist chiefly by the chase; the mountaineers practice agriculture. Life among the Tcheremisses is still very primitive. Polygamy is practiced by the pagan Tcheremisses, and the marriage customs recall the practice of having wives in common.

TCHORNOZEM, n. *chŏr'nō-zĕm* [Russ. *tchornie,* black; *zem,* earth]: the fertile black earth of the south of Russia, which covers every other deposit of the Aralo-Caspian plain.

TCHUDI, n. *chô'dē* [Russ.]: Russian name for the Finnic races in n.w. Russia, especially the Finns, Esthonians, Livonians, and Laplanders.

TEA, n. *tē* [F. *thé;* Russ. *tshai*—from Chin. *cha;* prov. Chin. *te* (pron. *tā*)]: dried rolled leaves of a shrub or small tree (see below) of several species of the genus *Thēa*, ord. *Ternstrœmiaceæ*, extensively cultivated in China and surrounding countries; an infusion of the dried leaves of the tea-plant in boiling water; the afternoon repast at which tea is drunk; by extension, an infusion of some other substance, e.g., beef-*tea*. TEA-CANISTER, small box for keeping tea intended for regular use. TEACUP, small vessel from which an infusion of tea is drunk. TEA-DEALER, one who sells tea. TEAPOT, small kettle or pot, with handle and spout, in which tea is infused. TEA-SERVICE, complete set of articles for the tea-table. TEASPOON, small spoon for stirring the infusion of tea and mixing in it the sugar, etc. TEA-URN, large ornamental vessel, containing hot water, for use on the tea-table.

TEA: an important article of commerce, the product of a shrubby plant of the genus *Thea*, nat. ord. *Ternstrœmiaceæ*, but so nearly allied to the genus *Camellia* (q.v.), of the same order, as to be placed by some botanists in that genus. The genus *Thea* seems to derive its importance entirely from a single species (*T. Sinensis*, by some called *Camellia theifera*), an evergreen shrub, which in cultivation grows to a height of 3–5 feet, with numerous branches and lanceolate leaves 2–4 inches long. The flowers grow singly or two or three together in the axils of the leaves; they are rather large, white, and fragrant, with 5-parted calyx, 6–9 petals, and many stamens. By cultivation for many centuries, numerous varieties of this plant have been produced in China, some of which have been reckoned as distinct species, particularly *T. viridis*, formerly supposed to yield green tea, *T. Bohea*, formerly supposed to yield black tea, and *T. stricta*. Of these, the first named has the longest, and the last has the shortest leaves. The Assam tea-plant (*T. Assamensis*), indigenous in Assam, is regarded by some as the parent species of the cultivated varieties. It grows to a height of 15–20 feet.

The cultivation of tea in China is chiefly confined to the provinces of Hûpih, Hû-nan, Ngan-hwuy, Kiang-si, Chĕh-kiang, Fŭh-kien (including Formosa), and Kwang-tûng, which produce the export varieties of tea. Tea for domestic use is, however, cultivated both in more southern and more northern regions, the celebrated Pû-erh tea, for example, being a product of a prefecture of the same name in the extreme s.w. of Yun-nan. The plant is to be accounted subtropical, but bears a tropical climate well, and can also accommodate itself to cold winters. In few of the countries into which it has been introduced, however, is the flavor of the dried leaf such as it is in China. The Chinese cultivate it chiefly on the s. slopes of hills. A new plantation is made by sowing the seed in holes at proper distances, two or three seeds being put into a hole to secure a plant. The first crop is obtained in the third year, when the shrub is not full-grown. When about seven years old, it yields only a scanty crop of hard leaves, and is cut down, when new shoots rise from the root and bear fine leaves in

abundance. This is repeated from time to time, till the plant dies at about the age of 30 years. The plant requires a well-manured or very rich soil, and the spaces between the plants (4 ft.) must be kept in good order and free from weeds. The farms always occupy the hillsides, where the soil is deep and well drained. Although an evergreen, the leaves can be gathered only at certain seasons: the first is in April, when the new leaves begin to burst from the buds; and some of these in their most tender state are gathered and made into young hyson of the finest quality—so fine, indeed, that it has rarely been exported, because it is said to lose flavor by the sea-voyage. Much is, however, sent overland to Russia, where it fetches a very high price. The ordinary picking begins just after the summer rains are over, at the beginning of May; and later in the season a third picking takes place, whose product is inferior, and used only by the poorer classes. The later gatherings are more bitter and woody than the earlier, and yield less soluble matter to water. The leaves freshly plucked possess nothing of the odor or flavor of the dried leaves, these properties being developed by the roasting which the leaves undergo in the process of drying. Moreover, different qualities of tea are prepared from the same leaves, which may be made to yield green or black teas at will.

Much mystery and error long existed as to the species producing the tea of commerce. By many it was said that the qualities known as black teas were produced by the species known to botanists as *Thea Bohea*, and the green teas from *T. viridis*. It is now generally recognized, however, that either black or green T. can be made from leaves of the same plant, the essential difference being in the methods of preparation. Black T. is sun-dried soon after being picked and before roasting, while green T. is roasted immediately after being picked and is not exposed to the sun at all. It is even said that in picking the leaves to be made into the choicest green T. the pickers stand with their backs to the sun, so as to prevent the action of the sun's rays on the leaf.

For the processes for obtaining the green and the black teas, see Fortune's *Tea Countries of China*, Johnston's *Chemistry of Common Life*, and Mo[illegible]y's *Cultivation and Manufacture of Tea* (3d. ed. 1879). It is sufficient here to remark, *first*, that, in drying, the leaves are roasted and scorched in such a way as necessarily to induce many chemical changes, the result being to produce the varieties of flavor, odor, and taste by which the different kinds of teas are distinguished; *secondly*, that the different colors of green and black are due to the mode in which the leaves are treated. For *green teas*, the leaves are roasted in pans almost immediately after they are gathered. After about five minutes' roasting, during which they make a cracking noise, become moist and flaccid, and give out a good deal of vapor, they are placed on the rolling-table, and rolled with the hands. They are then returned to the pans, and kept in motion by the hands: in about an hour, or rather more, they are well dried, and their color, which is dull green, but becomes

brighter afterward, has become *fixed*. The essential part of the whole operation is now over, nothing more being required than to sift and re-fire the material. For *black teas*, the leaves are spread out in the air for some time after they are gathered; then tossed about till they become flaccid; next roasted for a few minutes, and rolled, after which they are exposed to the air for a few hours in a soft and moist state; and lastly they are dried slowly over charcoal fires, till the black color is fairly brought out. The dark color and distinguishing flavor of black tea seem due to the long exposure to the atmosphere in the process of drying, and to the oxygen of the air acting rapidly on the juices of the leaf, and especially on the astringent principle during this exposure. To give special scents to different varieties of tea, numerous odoriferous plants are employed in different parts of China; the cowslip-colored blossoms of the sweet-scented olive (*Olea fragrans*) communicate an especially fragrant scent.

The adulteration of tea, formerly common, is now seldom resorted to, on account of the stringency of the inspection laws of the importing countries. The Chinese 'face' or give an artificial coloring to the green teas sent to Europe because it pleases the eye, but the coloring matter is innocuous, and is not produced by heating over copper plates. Prussian blue in very minute proportion, and a species of native indigo and gypsum, are the real materials employed.

From China and Corea the cultivation and use of tea spread in the 9th c. to Japan, where it is now used as universally as in China, and from which large quantities are exported, chiefly to the United States.

In 1826 tea was found growing indigenously in Assam; in 1834 the Chinese tea-plant was introduced; government established experimental plantations in Assam and in the sub-Himalayan districts of Kumaon and Garhwal; and since 1851, tea has been grown on a large scale in Assam, and less extensively in Bengal, N. W. Provinces, Punjab, and Madras. The export of Indian tea (1883) was nearly 60,000,000 lbs. (out of a total of 222,262,000 lbs.; value £11,543,000). In India three kinds of tea are grown—Assam, China, and Hybrid; the latter, a cross between the two others, being the most approved. India tea is better than much of the Chinese growth, and of late that exported by Ceylon in rapidly increasing quantities is preferred to Indian teas. The development of the Ceylon tea trade has been very great since the failure of coffee there; Java and Borneo also export tea. On the Brazilian highlands most excellent tea grows in large quantities. It is grown also in the Philippines, s. California, New Zealand, Caucasia, and on a small scale in Sicily—near Messina.

The tea of commerce is known as black T., green T., and brick T. By the Chinese, black tea is called *hung cha* or 'red' tea. Its chief varieties or brands are: (1) *Bohea*, from *boo-he*, the local pronunciation of *Woo-yi*, the name of two hills in Fŭh-kien where it is grown; (2) *Congou*, from Chinese *kûng-fû*. labor (locally pronounced *kong-hoo*), on

account of the labor of preparing it; (3) *Souchong*, Cantonese pronunciation of *siao chung*, 'little sorts'; (4) *Caper*, called in China *shwang-chi*, 'doubly manipulated.' The name caper is probably owing to the resemblance of the leaf to the flower-bud of the caper-bush; (5) *Oolong*, from Chinese *woo-loong*, 'black dragon'; (6) *Pekoe*, from *pak-ho*, Cantonese pronunciation of Chinese *pih-hao*, 'white down,' because picked before leaf-bud has expanded, and while covered with down—sometimes called Flowery Pekoe.

Of green teas, the principal varieties are: (1) *Twankay*, from *tun-khē*, an important tea-mark in the province of Ngan-hwuy; (2) *Hyson*, from *hē-chun*, 'glad spring.' Other hysons are: *young hyson*, and *hyson-skin;* (3) *Imperial:* called 'large pearls' by the Chinese, because made up into little balls like a pea; (4) *Gunpowder*, or 'little pearls,' the finest variety of green tea. As a rule these names have been applied to corresponding brands of Indian, Japanese, and Javanese teas.

Brick Tea is a common kind prepared in China by softening refuse leaves, twigs, etc., with boiling water and then pressing the compound into slabs like bricks. It is used in great quantity in Mongolia and Siberia, where it is used also as a medium of exchange.

The use of the infusion of the leaves of tea as a beverage is general in s.e. Asia, and has become prevalent among the English-speaking people of the world, as well as among Americans, and the Dutch. In Scandinavia, tea is much used by all who can afford it. In other parts of Europe, the use of tea is much less general, and is chiefly confined to maritime districts, towns, and the wealthy. The finest varieties of black tea go to Russia—formerly overland, but now by the Black Sea route. The Chinese, Japanese, and other eastern people use neither sugar nor milk in their tea—Russians flavor it with lemons.

The *substitutes* for tea, in countries where it is difficult to obtain it, are of two sorts: those which contain theine, and which consequently have the same stimulating effect; and those destitute of theine, and resembling the true tea in only flavor or smell, or possessing some other stimulating principle. Of those possessing theine are—(1) Maté (q.v.); (2) Guarana (q.v.): so rich is this material in theine that it has lately been used for obtaining that principle; and it has been introduced into Austria and France as a powerful medicine; (3) Coffee-leaves, occasionally prepared as a substitute in the W. Indies: they would be more generally used were it not for the disagreeable smell of the infusion; (4) the Kola-nut, whose active principle has been ascertained to be theine.

The second class, or those which do not possess theine, are very numerous; but only a few are important from their general use in the countries producing them. These are Siberian tea—leaves of *Saxifraga crassifolia;* Appalachian tea—leaves of *Prinos glabra;* Labrador tea—leaves of *Ledum buxifolium;* Chilian tea—leaves of *Eugenia ugni;* Trinidad pimento tea—leaves of *Eugenia pimenta;* and leaves of the Partridge-berry, used in parts of N. America.

The Faham tea of Mauritius, and a great many more, are properly classed as medicines, rather than as ordinary beverages; though they are generally classed with the substitutes for ordinary tea.

History and Commerce.—All that can be affirmed regarding the early history of this beverage is, that it appears to have been used for ages in China, where it is believed by the natives to be indigenous. It became known to Europeans at the end of the 16th c. It is mentioned by the Portuguese writer Maffei in his *Historiæ Indicæ* as a product of both China and Japan. The first reference to it by a native of Britian is in a letter dated 1615, June 27, written by a Mr. Wickham, which is in the records of the E. India Company; and it is noticeable that the Portuguese and English writers referred to use their own rendering of the native name *cha*. Maffei calls it *chia*, and Wickham, *chaw*. From this time, it became gradually known to the wealthy inhabitants of London, in the form of occasional presents of small quantities from India, obtained from China, or by small lots in the markets from time to time, but always exorbitantly dear, fetching sometimes as much as £10 the lb., and never less than £5. A rather large consignment was received 1657; this fell into the hands of a thriving London merchant, Thomas Garraway, who established a house for selling the prepared beverage; and that house, under the name 'Garraway's Coffee-house,' is still a famous establishment. The imports of tea into the United Kingdom in 1889 amounted to 222,147,661 lbs. (value $49,-939,835), of which 36,064,040 lbs. (value $8,711,025) were re-exported. The imports of tea into the United States during year ending 1890, June 30, were 83,886,829 lbs., valued at $12,317,493; exports, 391,873 lbs., valued at $97,-850. In 1880–90 the imports ranged from 67,665,910 lbs. (1884) to 89,831,221 lbs. (1887); the exports from 383,731 lbs. (1889) to 3,942,645 lbs. (1902); and the net imports from 60,061,944 lbs. (1884) to 108,574,905 lbs. (1902).

Tea, in its Chemical, Physiological, and Medicinal Relations.—On submitting the ordinary commercial tea to analysis, we find that it contains (1) a volatile or essential oil; (2) theine or Caffeine (q.v.); (3) a nitrogenous compound analogous to caseine or gluten; (4) a modification of tannin; besides gum, sugar, starch, fat, woody fibre, salts, etc. The following comparative analyses of tea, coffee, and the dry kola-nut, show how nearly they contain the same organic constituents:

	100 Parts of Tea contain	00 Parts of Coffee contain	100 Parts of Kola-nuts contain
Water	5	12	13·65
Theine	3	1·75	2·13
Caseine	15	13	6·33
Gum	18	9	10·67
Sugar	3	6·5	
Starch	a trace	a trace	42·00
Tannin	26·25	4	....
Aromatic oil	0·75	0·002	1·52
Fat	4	12	
Fibre	20	35	20·00
Mineral substances	5	6·7	3·20

The volatile oil gives to tea its peculiar aroma and flavor. The proportion in which it exists is, according to Miller, about 0·79 per cent. in green, and 0·6 per cent. in black tea. It may be obtained by distilling the tea with water, and is found to exert a powerfully stimulating and intoxicating effect. In China, tea is seldom used till it is a year old, on account of the well-known intoxicating effects of new tea, due probably to the larger proportion of essential oil which it usually contains. The headache and giddiness of which tea-tasters complain, and the attacks of paralysis to which, after a few years, persons employed in packing tea are found liable, are due to the action of this oil, which, according to Johnston, 'does not exist in the natural leaf, but is produced during the process of drying and roasting.'—*Chemistry of Common Life*, I.

The theine or *caffeine* varies considerably in different kinds of tea. It may readily be obtained by the following simple experiment. When dry finely powdered tea-leaves, or a dried watery extract of the leaves, are put on a watch-glass covered with a paper cone, and the whole is placed on a hot plate, or exposed to the heat of a spirit-lamp, a white vapor gradually rises and condenses on the interior of the cone, in the form of small crystals, which consist of theine. As it has no odor, and only a slightly bitter taste, it obviously has little to do with the taste or flavor of the tea from which it is extracted; it is, however, to the presence of this ingredient that the peculiar physiological action of tea on the animal economy is due. This substance is represented by the formula $C_8H_{10}N_4O_2$, and is remarkable for the large quantity of nitrogen, more than 33 per cent., which it contains—nearly double the amount in albumen, fibrine, etc. It is remarkable also as occurring in plants very unlike each other and growing in remote countries, which have by instinct been selected by different nations for the purpose of yielding a slightly exciting and very refreshing beverage (see above). If 6-8 grains of theine (or $\frac{2}{3}$ oz. of the tea containing it) be taken, there is general excitement of the circulation, the heart beating more strongly, and the pulse becoming more rapid; tremblings also come on, and there is constant desire to relieve the bladder. At the same time, the imagination is excited, the mind begins to wander, visions appear, and a peculiar intoxication comes on; the symptoms finally terminating, after a prolonged vigil, in a sleep arising from exhaustion. It is not definitely known what changes theine undergoes in the animal economy. The *nitrogenous compound* allied to caseine or gluten constitutes about 15 per cent. of the weight of the leaf. As hot water extracts very little of this substance, a large quantity of this nutritious matter, which forms about 33 per cent. of the dried spent leaves, is thrown away. Much of it might be dissolved if a little carbonate of soda were added to the boiling water with which the tea is made. To the *astringent principle*, or *tannin*, which forms 13 to 18 per cent. of the dried leaf, tea owes its astringent taste, its constipating effect on the bowels, and its property of communicating an ink-like color to water con

taining salts of iron Whether this ingredient contributes in any degree to the exhilarating, satisfying, or narcotic action of tea, is not known.

It is usual to judge of the quality of a tea by its aroma, and by the flavor and color of the infusion which it yields; but to these tests should be added the determination of the amount of soluble matter which it readily yields to boiling water. It is stated by Miller that our ordinary tea contains about 45 per cent. of soluble matter; but the independent researches of Davy and Peligot show that boiling water seldom extracts more than one-third of the weight of the dry tea; while in J. Lehmann's experiments only one-sixth (15·5 per cent.) was extracted. Good tea should, moreover, not yield more than 5 or 6 per cent. of ash when incinerated; and a portion of this is due probably to the coloring matter which the Chinese add to the green teas prepared for the foreign market. For this purpose, they used formerly a mixture of Prussian blue and gypsum; but indigo is now commonly used, which is probably harmless. Drinkers of green tea who wish to know which of these adulterations they are swallowing may easily determine the point by the following simple experiment: 'If a portion of the tea be shaken with cold water, and thrown upon a bit of thin muslin, the fine coloring matter will pass through the muslin, and settle to the bottom of the water. When the water is poured off, the blue matter may be treated with chlorine, or a solution of chloride of lime. If it is bleached, it is indigo; if potash makes it brown, and afterward a few drops of sulphuric acid make it blue again, it is Prussian blue.'—Prof. Johnston.

Much has been written regarding the dietetic and medical uses of tea. While some physicians have overpraised its value, others have regarded it as the source of numerous diseases, especially of the nervous system. Experience has proved that T. sustains the system without causing subsequent exhaustion and collapse. The pulse is a little quickened. The amount of pulmonary carbonic acid is, according to Dr. E. Smith, increased. The action of the skin is increased; that of the bowels lessened. The kidney excretion is little affected; perhaps the urea is a little lessened, but this is uncertain, the evidence with regard to the urine being very contradictory. Dr. Parkes regards it as a most useful article of diet for soldiers, and it is well known that cold tea is frequently preferred to beer or cider by sportsmen, reapers, and others engaged in laborious work in hot weather. As a general rule, tea is very injurious to young children, and is not a suitable drink till growth is completed; and adults of irritable constitution or leucophlegmatic temperament often suffer from its use. Those with whom tea does not agree will generally find cocoa the best substitute. Old and infirm persons usually derive more benefit and personal comfort from tea than from any other beverage of its class. In fevers, tea, in the form of a cold weak infusion, is often of great service. In persons of gouty and rheumatic tendency, and especially in such as are of the *Lithic Acid Diathesis* (q.v.), weak tea without

sugar, and with very little milk, is the best form of ordinary drink. In some forms of diseased heart, tea is a useful sedative, while in other cases it is positively injurious; and a cup of strong green tea, especially if without sugar or milk, will often remove a severe nervous headache. It is nearly as powerful an antidote in cases of opium-poisoning as coffee; and very strong tea has been the means of preserving life in cases of poisoning by tartar emetic, the tannin being in these cases the active agent. It is impossible to speak too strongly against the habit occasionally adopted by students of keeping off their natural sleep by frequent use of strong tea; such a habit is certain to lead to the destruction of both bodily and mental vigor. See Money, *The Cultivation and Manufacture of Tea* (3d ed. 1879).

TEACH, v. *tēch* [As. *tæcan*, to instruct: Goth. *gateihan*, to announce: Ger. *zeigen*, to show: Gael, *teagasg*, instruction: Skr. *âdich*, to teach]: to impart knowledge to; instruct; accustom; inform; tell or show; suggest to the mind; perform the office of instructor; to instruct for a livelihood. TEACH'ING, imp.: N. the act of instructing; instruction. TAUGHT, pt. pp. *tawt*, instructed; informed. TEACH'ER, n. *-ėr*, one who teaches; an instructor. TEACHABLE, a. *tēch'ă-bl*, that may be taught; apt or willing to learn; docile. TEACH'ABLENESS, n. *-nĕs*, the quality of being teachable; willingness or readiness to be instructed; docility; capacity to learn.—SYN. of 'teach': to inform; instruct; train; acquaint; apprise; advise; tell; guide; admonish; counsel.

TEACH, or TEACHE, n. *tēch:* in *sugar-works*, the last receptacle in which the cane-juice is boiled.

TEACH, or THATCH, EDWARD (Blackbeard the Pirate): American pirate: b. Bristol (?), England; d. on the James river, Va., 1718, Nov. 22. He is supposed to have gone out to the West Indies during the war of the Spanish succession, engaged as a privateer, and to have turned pirate in 1713 when the privateers refused to recognize the peace. He is first heard of in 1716 and from that time he cruised among the West Indies, along the Spanish Main, and the coasts of Virginia and Carolina, in his sloop, *Queen Anne's Revenge*, capturing numerous prizes and making his name a terror wherever known. In June, 1718, his sloop was wrecked off North Carolina, and Thatch with some 30 of his men surrendered to the king's proclamation. He made an ally of the governor, Eden, who afterward countenanced his piracy in view of a certain share in the spoils, and for a time led a rollicking life, forcing the planters to supply his wants and exacting toll from all vessels which came up or down the river. The planters at length appealed to Col. Alexander Spottiswood, lieutenant-governor of Virginia, who fitted out an expedition against the pirate, and on Nov. 22, 1718, the sloops moved up the river. Every man in the commander's boat was killed,

and the captain, Robert Maynard, slew Thatch in a hand to hand struggle. His career is one of the most romantic in the history of American piracy, 'Blackbeard the Pirate' being considered the ideal type of the pirate of fiction, and the interest which centres around him is second only to that in Capt. Kidd. Consult his *Life* in Charles Johnson's *Lives of the Pyrates* (1724).

TEACHERS' COLLEGE: a school for the training of teachers, affiliated with Columbia University. For several years the college has maintained courses for teachers in the New York schools, and since 1897 has made these courses an integral part of the regular college courses. The continual increase in the number of teachers taking these courses led to the organization of an extension department in 1903 which includes the entire university system.

TEACHERS' INSTITUTES. See TEACHERS, PROFESSIONAL TRAINING OF.

TEACHERS, PROFESSIONAL TRAINING OF: the idea of professional training of teachers is one of comparatively recent development. Formerly the teachers in colleges, the high grade academies, and other select schools were of course educated men; and many of the common school teachers were also college graduates, or undergraduates teaching during the vacations; while many others had received only an academic education. Yet there was no idea of professional training, nor of giving particular attention to the qualifications of any individual for teaching as a profession. The demand for better teachers was a marked feature of the great democratic movement toward popular education in the early part of the 19th century. The method of teaching that bears the names of Bell and Lancaster was highly mechanical and required considerable skill in its conductors; as a result of the spread of this system a model school was established in Philadelphia in 1818, without doubt the first training school for teachers in the United States; but its career was brief, as it did not outlive the movement of which it was a part. The first permanent schools for the professional training of teachers were established in Massachusetts in 1839-40. With the constant increase of this demand for better teachers, and the development of the idea that teaching is a profession which should rank with other professions, the agencies for the training of teachers have multiplied. They include normal schools and colleges, summer schools, university extension lectures, teachers' reading circles, teachers' training classes, chairs of education in colleges and universities, and teachers' colleges.

Normal Schools.—The first normal schools, as has been said, were established in 1839-40 at Lexington, Barrie, and Bridgewater, Mass. These schools had at first both private and public support, individuals and the state

legislature sharing in founding them; they were an experiment and the legislature would not bind itself to support them for more than three years; they were finally, however, incorporated into the state system of education; and the number of normal schools in the state increased. The northern and central states also generally adopted the normal school system; and in the west the normal schools grew with other educational institutions. In the south all normal schools have been established since the Civil war, but now hold a recognized place in the educational systems of the southern states. New York was the second state to establish a normal school, at Albany in 1844; Michigan established the first normal school west of the Alleghanies. The dates of the founding of other leading schools are as follows: New Britain, Conn., 1850; Boston, Mass., 1852; Normal, Ill., 1857; Millersville, Pa., 1859; Oswego, N. Y., 1860; Emporia, Kan., 1864; Framington, Me., 1864; Winona, Minn., 1864; Chicago (Cook co.), Ill., 1867; Plattville, Wis., 1866; Nashville, Tenn., 1875; Cedar Falls, Iowa, 1876; Terre Haute, Ind., 1870.

The ordinary courses in the state normal schools include history and theory of education, school organization, school discipline, psychology and child study, and methods of teaching the ordinary subjects of the school curriculum; practice work in a model or training school is also a part of the work. School hygiene and ethics have been added to some curriculums. The length of the courses varies, mostly from two to four years; some schools have only a one year's course, while some have a five years' course. In the longer courses work of an academic character in addition to the professional work is usually included; and many of the best schools in their best courses give nearly the equivalent of the first two years of college work. Special courses for college graduates are frequently offered, intended to give in one year a professional training for teaching; and advanced courses for normal graduates are almost universally provided. The requirement for admission to normal schools in Massachusetts is graduation from an approved high school, or equivalent education; the usual standard of admission in other states is not so high. On the whole, there has been a growing tendency to raise the standards of admission and to strengthen and diversify the courses of study. Some normal schools, assuming higher functions, have also taken the name of college. Prominent among these is the New York State Normal College at Albany, which is the successor of the school founded in 1844. It offers two courses, the English and the classical, both including instruction in methods and professional subjects only. Graduates in either course are entitled to life state certificates. Other normal colleges are the Michigan State Normal College, which confers the degree of bachelor of pedagogics on those who complete the four years' course, and the Normal College of the

City of New York. The cities have also established normal schools, generally called training schools, for the education of local teachers; nearly all the large cities, and many smaller cities have their own independent schools. In 1895 the New York legislature passed a law empowering cities and villages employing superintendents of schools to establish training schools which are aided by state funds, and have a uniform course of study. Private enterprise has also established and maintained a large number of normal schools. The United States education report of 1902 gives 109 private normal schools and 175 public normal schools, the private schools having 15,665 students, the public schools 49,403.

Training Classes and Courses in Schools and Colleges.—In the high schools it is in some places the custom to make a course in the history and theory of education an elective for those desiring to become teachers; the more common custom is to organize training classes for graduates of the high school who wish to take professional training for teaching; these classes are much like the city training school, but are not so far developed and form a post-graduate department of the high school instead of a separate institution. The demand for the improved training of teachers soon affected the colleges and universities and led to the establishment of courses and professorships of education. President Wayland sought to establish a course in the science of teaching at Brown as early as 1850, but this new system of which this course was a part was not successful; an elective course in the theory and practice of teaching was made a part of the curriculum at Antioch College, Ohio, in 1853. The first university to establish a permanent professorship in education was the University of Michigan, which established a chair of the science and art of teaching in 1879. This has since grown into a separate department offering 10 courses. Along this line of development the state universities have been the leaders. These teachers' courses include generally history and theory of education and educational psychology or child study; other courses often given are school organization and supervision, the science and art of teaching and sometimes special teachers' courses in different departments of study, the languages, mathematics, history, etc. The United States education report for 1902 reports 375 colleges and universities with teachers' training courses. Of these the state universities of Arkansas, California, Colorado, Indiana, Iowa, Kansas, Michigan, Minnesota, Mississippi, Missouri, Tennessee, Texas, Utah, West Virginia and Wisconsin, South Carolina College, and Ohio University, and Brown, Columbia, Cornell, Leland Stanford, Jr., and Northwestern universities, and Randolph Macon Woman's College have separate departments of pedagogy. A further development of this movement has been the establishment of the teachers' colleges, affiliated with some university.

Teachers' Institutes.—The institute is a meeting of those engaged in the work of teaching, for a wider study of subjects of the school curriculum and of the methods of school organization, discipline, etc. Important also are the lectures and other exercises of the institute that deal with historical, literary, and scientific subjects. At first the institute was a purely voluntary agency. There were no funds for its support, save such as the teachers attending and public-spirited citizens supplied. Massachusetts first appropriated money for institutes in 1846; New York and Ohio, in 1847; Pennsylvania, in 1855. In course of time the institution was firmly imbedded in state school laws, and at present most of the states, if not all of them, give it some legal recognition and financial support. In 1867 Pennsylvania passed a law requiring acting teachers to attend their respective institutes; a similar provision is in force in New York state. The institutes are held at all seasons of the year; in cases where attendance is compulsory the local authorities are required to close the schools if the institute is held during the school term. Institutes are of numerous types, presenting such divergencies that it is difficult to define the species. There are state institutes and county institutes; district, city, and town institutes. However, the best known type takes its name from the county, which is the civil division that, as a rule, furnishes the best unit of organization and management. This type alone presents many varying features. Some county institutes continue but a day or two; some, several weeks. Some are conducted by state authorities, as the superintendent of public instruction or his assistants; some by local authorities, as county superintendents, or officers of teachers' institute associations. Some are carried on much like a school, with text-books, set lessons, and recitations, together with lectures; some depend upon lectures alone. Some are graded with a view to securing instruction especially adapted to the different classes of teachers; others are wholly unclassified and the attendants all receive the same instruction. Sometimes two or more counties are thrown together in one district, it may be for a year only, in order to secure, through the concentration of funds and influence, a longer term and better advantages. State institutes, which are infrequent, commonly look more to the needs and interests of the better teachers of the state. City institutes are conducted with special reference to local needs. A private institute of importance has been established by the Catholics under the name of the National Catholic Teachers' Institute. National meetings are not held, but local institutes are organized for the benefit of the teaching orders. The work was begun in 1895 under the auspices of the Paulist Fathers in New York.

Teachers' Reading Circles.—The teachers' reading circle movement originated in Ohio, where it was fully established in 1883. It is designed to furnish a course of

reading partly professional, partly general, under the direction of the State Teachers' Association in each state. It is usual for the state associations to appoint a special board to plan a course of reading from year to year, to select the books, and provide examinations on the courses. In connection with this work local classes or circles are formed for carrying on the course. The efficiency of this work naturally varies widely in different states, but is generally conceded to have done much good in arousing interest in the better culture of teachers and in organizing courses of reading.

Summer Schools and University Extension.—Neither of these educational agencies was designed solely for teachers, but they have been so largely taken advantage of by teachers for the improvement of their professional work that they may fairly be included among the means of training teachers. Among summer schools, though the majority are general in character, often including pedagogical courses in their curriculum, some are established especially for teachers and offer mostly professional courses, courses in methods, etc., though including also academic subjects. The university extension lectures as a rule take no account of teachers as teachers; but teachers are generally prominent on local committees and in classes, and sometimes pedagogical courses are included in extension programmes.

TEACHING OF THE TWELVE APOSTLES.—TEACHING OF THE LORD, THROUGH THE TWELVE APOSTLES, TO THE NATION.: double title prefixed to a very ancient and highly important manuscript, found 1873 by Philotheos Bryennios, Metropolitan of Nicomedia, in the library of the Monastery of the Most Holy Sepulchre in the Greek quarter of Constantinople. As the monastery is connected with the patriarchate of Jerusalem, Bryennios called it the Jerusalem Codex. No other existing copy is known. It consists of 318 lines in Greek, covering five leaves of vellum 7½ in. by 6 in., and accompanying 115 other leaves which contain Chrysostom's Synopsis of the Old and New Testaments, Epistle of Barnabas, two epistles of Clement of Rome, Epistle of Mary of Cassobelæ to Ignatius, twelve epistles of Ignatius, the genealogy of Joseph, etc., all by one hand; and it is dated and signed the year 6564 'by the hand of Leon, scribe and sinner.' The Greek reckoning of the creation being B.C. 5508, the date of the copy would be A.D. 1056; and the original document (of which this, by comparison with portions of it incorporated into very early Christian writings, e.g., the Epistle of Barnabas, etc., is evidently a trustworthy transmission) is referred to about the beginning of the 2d century—the approximate date being fixed by quotations from it in documents of known early date. Thus the original goes back to about the date of the death of the Apostle John, but there is no evidence in the document that the author was acquainted with the books of the New Testament, except the gospel of

Matthew and perhaps that of Luke; his purely practical purpose, quite aside from historical and doctrinal, would not bring other New Testament books into view. He addresses the 'nations,' i.e., Gentile Christians, and his scope is ethical chiefly. There is first a description of the way of life as involving love to God and one's neighbor, with injunctions against various offenses, and the means of cultivating specified virtues by piety toward God, keeping the Lord's commandments, heeding instruction, confessing sin. The way of death is then described, with full mention of crimes, vices, sins, and evil dispositions. Following this are warnings against false teachers and eating food offered to idols; rules for the Christian community in respect to the observance of baptism, fasting, prayer, the Lord's Day, the eucharist, the reception of teachers, apostles, prophets, and strangers; the maintenance of the prophets; and the appointment 'for yourselves' of bishops and deacons. Then there are exhortations to mutual reproof, discipline, obedience, closing with the duty of watchfulness for the Lord's coming, and a description of the 'last time' before the coming of the Lord—the language much like that of the New Testament, referring to false prophets, hatred, lawlessness, persecutions; 'then shall appear the world-deceiver as the Son of God, and shall do signs and wonders, and the earth shall be given into his hands, and he shall commit iniquities which have never yet been done since the beginning; then all created men shall come into the fire of trial.'

What are termed the evangelical doctrines are implied rather than expressed. In respect to observances, the fourth and sixth days of the week are recommended for fasting; the Lord's Prayer is given in full, and as an exercise thrice a day; the Lord's Day is to be observed with assembling, breaking bread, thanksgiving, and confession; the eucharist only by baptized persons; baptism in warm water if there be none cold, and, 'if neither,' then by pouring water on the head. All directions for these observances seem to be given to the body of believers; and the service of officers appears as that of teaching, apostles being itinerant teachers. The author of the document prescribes the first six sections, preceding the subject of Christian rites, as a lesson to be read to candidates for baptism.—For text. translation, and a full discussion, see *Teaching of the Twelve Apostles*, by Roswell D. Hitchcock and Francis Brown, 1885, revised and enlarged edition; for text and translation in cheaper form, same title, edited by J. Fitzgerald, New York, John B. Alden; translations also in the *Andover Review*, *Journal of Christian Philosophy*, *Churchman*, etc. (all 1884). Of the many critics of the document, some speak of it as representing a germinal or embryonic stage of Christianity; but it is a question whether the teaching and ordering of the Twelve Apostles, commissioned to establish the religion, are to be brought under

the botanical and zoological conceptions now so generally applied.

TEACHING, THEORY AND ART OF: the theory of teaching is based on the knowledge that the mind has its own habits and modes of activity. The science of psychology investigates the mind's proceedings and discovers its principles of action. The theory of teaching rests fundamentally upon the laws and principles of psychology. The psychologist discovers that the mind always moves from the vague to the definite, from the simple to the complex, from the known to the related unknown, and from sense knowledge to representative knowledge. The theory of teaching starts with these facts and other phenomena of the mind and constructs the science of education. The art of teaching is an orderly proceeding by which the learner, through his own activity and experience, is brought with the least waste of time or energy to a realization of the relation between the objects that present themselves to his senses or the thoughts in his mind, to the realities from which they proceed.

The distinction between the theory of teaching and the art of teaching runs quite parallel to the distinction between art and science. Art in the development of a subject is at first empirical. When the objects that constitute the stock of ideas known as common or empirical knowledge are worked over in our thoughts, classified, and the necessary relations between them established, empirical knowledge passes over into the realm of the scientific and becomes usable and trustworthy. The use of usable and trustworthy notions makes comparatively easy the art of teaching.

Education seeks, through social stimulation, guidance and control, to cause the learners to grow to be able and disposed to lead happy, healthy, and morally worthy active lives. The theory of teaching, well understood and worked into habits of orderly procedure, makes the teacher's art one of safe and sure progress in building a character suitable to the activities of this life, and with a disposition to look ahead to remote ends and enduring benefits that may approach the limits of human capacity.

The theory of teaching has for its great aim or purpose a discovery of the laws of stimulation, guidance, and control that apply in a general way to human activity. It starts from the fundamental conception that education results from activity; that through the self-propelling forces of human nature the child, if properly stimulated, guided, and controlled, becomes educated by habitually responding to those external and internal factors that will cause him to grow to be both able and disposed to find personal happiness in the general good, to subordinate the pleasures of the present (when there is a conflict between them and those of the future) to remote good, and to realize that progress results from

doing those things that lead to active co-operation with others who are inspired to work in harmony with right conceptions.

The art of teaching seeks to establish a union in the mind of the teacher of orderly and forceful ideas to enable him to reach a realization of the ends and aims of education. The art of teaching, based on the principles of mental, moral, and physical growth and development guides the teacher in his work from hour to hour, from day to day, and from year to year, so that what he does consciously and perhaps awkwardly at first, when he seeks adjustment of self to pupils and of pupils to subject, becomes habit as time advances and causes him to avoid waste of time or loss of energy in teaching and in managing. Thus for illustration, the theory of teaching discovers the factors in the lesson as herein indicated, and the art of teaching makes them a part of each teacher's daily practice.

Some Factors in the Lesson.—(1) To inspire a desire for related knowledge. (2) To encourage consecutive mental effort and guide self-activity. (3) To stimulate the fusing of old ideas with related new ideas so that the subjects may stand as units in the minds of learners. (4) To reward the faithful; arouse the dull; expose the unreliable; and cultivate sustained attention.

Preparation.—(1) Pupils should understand the purpose of the lesson and set it forth clearly. (2) Preliminary discussion, guided by the teacher, should bring closely together known ideas that relate to the new notions to follow. (3) Care should be exercised to guide learners in separating useful from irrelevant material. (4) Properly made presentations make pupils eager to elaborate the new. (5) The old should be clearly within the field of consciousness before the new is presented.

Presentation and Development.—(1) In the recitation pupils should use the material they have gathered and arranged. (2) After bringing out the old facts pertinent to the subject, they should present the new ideas. (3) Pupils should express the new ideas in terms of the old and the old in terms of the new. (4) They should be pointed and consecutive in statement. (5) They should establish the relation of each point in the central idea or aim. (6) Generalizations should be made by the pupils; not by the teacher.

Illustrations.—(1) Illustrations of the pupil's own make should always accompany the presentation. (2) Appeal to the senses leaves images and aids the understanding. (3) Illustrations reach the 'mind's eye' as well as the physical eye. (4) What cannot be illustrated in some way is not apperceived.

Drill.—(1) Drill should follow preparation, presentation, association and comparison, generalization and illustration. (2) Pupils should feel that drill is the application of knowledge. The recitation is dead when learn-

ers realize they are 'thrashing old straw.' (3) Drill should make pupils ready in generalizing and summarizing. (4) The interest of striking contrast, of new and apt illustrations, and of the feeling of power, should characterize all drill work. (5) Rational drill leads to right habits. Its great good is reached when learners do what they should unconsciously.

Assignment.—(1) Learners should know where to begin and where to stop. (2) Learners should know what material they should gather and what to do with it. (3) Learners should clearly grasp the aim of the lessons and study to relate subordinate notions to the central idea. (4) The assignment properly made is the most valuable part of the lesson. It is a wicked waste of time to make hasty assignments.

Atmosphere.—(1) Good-natured and polite determination is contagious. (2) Nagging, scolding, or fretting kills interest and fosters antagonism. (3) Propriety in dress, speech, and manner promotes æsthetic and ethical qualities. (4) Engaging, sympathetic personality counts for success.

A Plan of Study.—I. Aim. II. What should be known or done. III. What is known. IV. What remains to be done. (*a*) Teaching is a process of reaching an end which can be approached only through a series of steps. The teacher must be conscious of the aim and the steps to be taken to realize the purpose. (*b*) While teaching is a mental process, there is an orderly way of moving from where one now is to where he seeks to be. There is a mechanical phase to every teaching act, yet every teacher must guide the spiritual movement which puts the mind of the learner in touch with his mind and with the truth to be realized. (*c*) The mind of the pupil moves forward in the same line as that of the teacher, with whom there is a vital, sympathetic touch, in which the learner comes to experience the thoughts, feelings, and purposes of the teacher. (*d*) In realizing the aim of a lesson, in taking the steps to be known or done, in recognizing what is already in the mind, and seeing clearly where stress and consequent effort care to be placed, that mastery may follow, each one perceives, imagines, compares and contrasts, reasons and generalizes. (*e*) The teacher's aim in each day's work must become the pupil's aim. The teacher must be alive to the relation between the external means of learning the lesson and the internal experience he is to stimulate. (*f*) Assigning lessons is the test of the teacher's skill in stimulating, guiding, and controlling activity. The pupil who realizes the aim of the new effort, who sees what must be known or done to feel the victory of mastery, who knows he has already gained, and who approaches what is partially new through the contents of his mind by means of the stress he puts upon himself because of his contact with the teacher, will enjoy his lessons as he does his games.

TEAK, *tēk:* name of two kinds of timber, valuable for ship-building and other purposes—one known as INDIAN T., the other as AFRICAN T. The trees which produce them belong to very different orders.—INDIAN T. (*Tectona grandis*) is a tree of nat. order *Verbenaceæ.* It is found in mountainous parts of Malabar, and elsewhere in Hindustan, and in the Eastern Peninsula, Ceylon, Java, etc. It was early introduced into parts of India, in which it is not indigenous, but where it is known to have been in use more than 2,000 years. It takes 60 or 80 years to grow to a large size. It is a beautiful tree, attaining a height sometimes even of 200 ft., and rising above all the other trees of the E. Indian forests. It has deciduous oval leaves 12–24 inches long, covered with rough points; great panicles of white flowers, with 5–6-cleft corolla, and 4-celled drupes about the size of a hazel-nut. Its flowers are used medicinally in cases of retention of urine, and its leaves by the Malays in cholera. Silk and cotton stuffs are dyed purple by the leaves. The timber is the most valuable produced in the E. Indies; it is light and easily worked, strong, durable, and not liable to attacks of insects. It abounds in silex, and resembles coarse mahogany. It is extensively used for ship-building, for which purpose it is exported. All the finest ships built in India, and many built in England, are of teak. The most extensive T. forests are in Pegu. The T. generally grows in clumps in forests more than it forms forests of itself.—AFRICAN T., sometimes called AFRICAN OAK, is a timber similar to E. Indian teak: it is now believed to be the product of *Oldfieldia Africana,* a tree of nat. order *Euphorbiaceæ.*

TEAL, n *tēl* [Dut. *teling*]: a small species of wild duck, of the genus *Querquedula* (or *Nettion*) and family *Anatidæ,* with very slightly lobed hind toe, narrow bill, as long as the head, the sides nearly parallel, or widening a little at the end, the wings pointed, the tail moderately large and wedge-shaped. Teal generally frequent rivers and lakes, feeding principally at night on aquatic insects, worms, mollusks, seeds, etc. The COMMON T. (*Q.* or *N. crecca*) is plentiful in most parts of Europe, and is occasionally but rarely seen in N. America. Its whole length is about 14 inches. It is a very beautiful bird; the head of the male brownish red, the body transversely undulated with dusky lines a white line above, and another beneath the eye, the speculum black and green. It makes its nest on the margins of lakes or rivers, of decayed vegetable matter lined with down, and lays eight or ten eggs. Its flesh is extremely delicate. It was domesticated by the ancient Romans, and seems capable of being advantageously introduced into poultry-yards.—The GARGANEY (q.v.) is a British species.—The GREEN-WINGED T. (*Q.* or *N. Carolinensis*) of N. America is very similar to the Common T., but it is at once distinguished by a white crescent in front of the bend of the wings: it is occasionally seen in Europe. In its summer migrations, it visits far n. regions.—The BLUE-WINGED T. (*Q. discors*) is very abundant in many parts of N. America: see BLUE-WING.

TEAM, n. *tēm* [Icel. *taumr*, a rein, a bridle: Sw. *töm;* Dan. *tömme*, a rein: Low Ger. *toom*, a rein, progeny: AS *teám*, a family]: two or more horses or other beasts of burden harnessed together for drawing; a working body of men, as of cricketers or base-ball players; in *OE.*, a litter; a brood: V. in *OE.*, to join together in a team. TEAM'-STER, n. *-stĕr*, one who drives a team.

TEAPOY, n. *tē'poy* [Anglo-Indian, *tipai*, corruption of Pers. *cipai*]: three-legged table with a lifting top, inclosing tea-caddies or a small stand for holding tea-cup, sugar-basin, cream jug, etc.

TEAR, n. *tēr* [AS. *tær;* Goth. *tagr;* Dan. *taar;* Icel. *tár;* Gr. *dakru;* Gael. *deur*, a tear]: one of the fluid drops which flow or fall from the eyes through excessive grief joy or as a result of irritation or injury (see LACHRYMAL ORGANS): any moisture trickling in drops. TEAR'FUL, a. *-fŭl*, full of tears; shedding tears. TEAR'LESS, a. *-lĕs* without tears; unfeeling. TEAR'FULLY, ad. *-lĭ*. TEAR'FULNESS, n. *-nĕs*.

TEAR, v. *tär* [Goth. *gatairan*, to break up, to destroy Low Ger. *teren;* Icel. *tæra*, to consume: Ger. *zerren*, to tear: Russ. *dira*, a rent]: to separate by violence; rupture shatter; divide by pulling; rend; remove or take away by violence, or by some degree of force; to go very fast, as to *tear* along; to rave; to rage; to agitate: N. a rent; a rupture; a separation by violence. TEAR'ING, imp.: ADJ. raving, noisy; impetuous; making a violent rent. TORE, pt *tōr*, or TARE, pt. *tär*, did tear. TORN, pp. *tōrn:* ADJ. ruptured; pulled asunder with some degree of violence. TEAR'-ER, n. *-ĕr*, one who tears. TO TEAR FROM, to separate and take away by force. TO TEAR OFF, to pull off by violence. TO TEAR OUT, to pull out by violence. TO TEAR UP, to rip up; to pull to pieces.—SYN. of 'tear, v.': to burst; rend; crack; break; split; lacerate; wound; shatter.

TEAR'PITS see DEER.

TEASE, v. *tēz* [O. Dut. *teesen*, to pick, to pull about: Ger. *zausen*, to pick or tease wool: Bav. *zaisel*, a teasel: Scot. *tousel*, to rumple, to pull about: Dan. *tæse*, to tease wool]: to separate or pull apart the fibres of; loosen by picking, as to *tease* oakum; to comb or card, as flax or wool: to raise and dress the nap of cloth; to reduce to shreds or fragments. TEAS'ING, imp. TEASED, pp. *tēzd*. TEASER, n. *tēz'ĕr*, one who teases; an instr. for carding, or for reducing to fragments. TEASEL, or TEAZEL, or TEAZLE, n. *tē'zl*, plant whose prickly heads or burs are employed to raise a nap on cloth (see below): V. to dress the surface of cloth with teasels. TEA'SELING, imp.: N. the cutting and gathering of teasels: raising a nap by means of the teasels. TEASELED, pp. *tē'zld*. TEASELER, n. *tēz'lĕr*, one who teasels.

TEASE, v. *tēz* [imitative of setting on a dog by hissing or snarling sounds: OF. *enticer*, to excite, to provoke: Sw. *tussa*, to set on]. to annoy or vex by petty requests, by jesting, or by impertinent importunities; to put into a heat of temper; to plague; to irritate. TEAS'ING, imp. TEASED,

pp. *tēzd.* TEAS'ER, n. *-ēr*, one who teases; the stoker or fireman who attends to the furnace of a glass-work.—SYN. of 'tease': to annoy; molest; vex; disturb; harass; irritate; mortify; torment; plague; chagrin; tantalize; worry.

TEA'SEL: plant of genus *Dipsacus*, nat. order *Dipsacaceæ.* This order consists of herbaceous and half-shrubby exogenous plants, with opposite or whorled leaves, and flowers in heads or whorls, surrounded by a many-leaved involucre. About 150 species are known, natives of temperate parts of the old world. In the genus *Dipsacus*, the flowers are separated from each other by long, stiff, prickle-pointed bracts. The only valuable species of the order is the FULLER'S T., or CLOTHIER'S T. (*D. fullonum*), native of s. Europe, and supposed to be a cultivated variety of the wild *D. sylvestris*, from which it differs but little. The latter is naturalized in the United States, and the former escapes somewhat from cultivation. It is a biennial, several ft. high, with sessile serrated leaves, the stem and leaves prickly; and with cylindrical heads of pale or white flowers, between which are oblong, acuminated, rigid bracts, hooked at the point. The heads are cut off when the plant is in flower, and are used in woolen factories, and by fullers and stocking-makers, for raising the nap on cloth. No mechanical contrivance has yet been found to equal T. for this purpose; to which the hooked points, the rigidity, and the elasticity of the bracts are admirably adapted. The heads of T. are fixed on the circumference of a wheel or cylinder, which is made to revolve against the surface of the cloth. T. is cultivated in many parts of Europe. The seed is sown in March, on well-prepared strong rich land, and the plants thinned out to 12 inches apart. In Aug. of the second year the heads are ready to be cut. They are packed in bundles of 25 each, and about 160 such bundles are the usual product of an acre. The flowers of T. abound in honey, and the seeds are used for feeding poultry. The root was formerly in use as a diuretic and sudorific.

TEAT, n. *tēt* [O. Dut. *titte;* Ger. *zitze;* W. *teth;* Sp. *teta;* It. *tetta;* Gr. *titthos*, a breast: Icel. *totta*, to suck]: the nipple of the female breast; a pap; a dug. TEAT'ED, a. in *bot.*, having protuberances resembling the teats of animals.

TEAZEL and TEAZLE: other spellings of TEASEL (q.v.; see also TEASE 1).

TEBBAD, n. *tĕb'băd* [Pers., fever wind]: a hot scorching wind that sweeps across the dry sandy plains of central Asia, bearing clouds of impalpable sand.

TECHE, BAYOU, *bī'ō tĕsh:* formerly the lower part of the channel of Red river, extending from Bayou Courteau-bleu, e. of Opelousas, La., around Grand Lake basin, to the Gulf of Mexico; 175 m.; now including also the lower part of the Atchafalaya river, s. of Grand Lake. It is navigable for much of its course by small steamers. Below the head of navigation it is the richest sugar region in La., and one of the most noted in the world.

TECHILY, TECHINESS: see under TECHY.

TECHNICAL, a. *těk'nĭ-kăl*, or TECH'NIC, a. *-nĭk* [Gr. *technĭkos*, artistic, relating to art—from Gr. *technē*, art, a trade: F. *technique*]: pertaining to the mechanical arts, or to a particular art, science, or employment; belonging or appropriate to a particular profession. TECH'NICALLY, ad. *-lĭ*. TECH'NICAL'ITY, n. *-kăl'ĭ-tĭ*, quality of being technical or peculiar to the arts; a technical word or expression: also TECH'NICALNESS, n. *-nĕs*. TECH'NIC, n. *-nĭk*, artistic skill. TECH'NICS, n. plu. *-nĭks*, such branches of learning as relate to the arts; the doctrine of arts in general.

TECH'NICAL EDUCATION: education in applied art and applied science, comprehending instruction in science and the principles of art. The branches of study pursued are elective or divided into courses, and include mathematics, physics, engineering (civil, mechanical, and mining), chemistry, geology, mineralogy, and other natural sciences. So far as requisite, general education and the German and French languages are added, to make the special branches more effective. The education may be for the general student or for the specialist. In the United States, military and naval academies took the lead to some extent. The Rensselaer Polytechnic Institute (q.v.) was established 1824, and the same year the Franklin Institute, Philadelphia—the latter confined to a library and courses of lectures. The Sheffield Scientific School (see YALE UNIVERSITY) was founded 1847, and the Lawrence Scientific School the same year (see HARVARD UNIVERSITY), followed by the Polytechnic Coll. of Penn. (Philadelphia) 1853, and others later. Technical education has departments in some colleges, and is included in Agricultural Education (q.v.), and enters to some extent into the more exclusively practical Trade Schools (q.v.) and the new movement for Manual Training (q.v.). In recent years private munificence in this direction has established the superb Pratt Institute (q.v.) in Brooklyn and the Drexel Institute in Philadelphia. See EDUCATION. See also Annual Reports of the U. S. Commissioner of Education.

T. E. has long received much attention in Europe, and various institutions for its promotion have been established—in Germany, France, and England especially, greatly advanced by governmental aid and control. The *Polytechnique* (q.v.) at Paris was founded 1794, and this with other advantages long gave the French pre-eminence in the arts particularly. The *Potytechnica* of Germany are without the special military feature of the above French institution. In England, industrial art received a great impulse from the London Exhibition of 1851. Local committees for T. E. were organized (by the governmental dept. of science and art) in places lacking or demanding instruction in science or art: these have established schools; and by means of prizes, payment on results to certified teachers of ordinary elementary schools, and scholarships, have efficiently subsidized instruction in science and art in the kingdom. The subjects of examination, more than 20, include the ordinary branches of science, also mining, metallurgy, navigation, nautical

astronomy, steam, agriculture, and physiography; and the examinations are conducted annually all over the country, the questions being framed by a staff of eminent scientific men; the main centre of the whole machinery being at South Kensington. Colleges also were subsidized by the Science and Art Department: Owens College, Manchester; Sir Josiah Mason's College, Birmingham; and Firth College, Sheffield. The Govt. School of Mines and Metropolitan School of Science applied to Mining and the Arts was organized anew 1881 under the title 'Normal School of Science and Royal School of Mines.' In 1878 a number of the city guilds of London associated to promote or organize, or, it might be said, initiate, more practical technological education—an association since joined by successively more of the city guilds, and latterly by the corporation. 1881, May, the foundation-stone of a great technical college, Finsbury College, was laid in Tabernacle Row, London. At Manchester, Preston, Dewsbury, Hawick, Sheffield, Leicester, etc., are schools to instruct artisans and others in the application of science and art to particular industries. The foundation of the great central institution at South Kensington was laid 1881. The plan includes laboratories on a complete scale, with work-shops, lecture-theatres, and class-rooms. It aims to supply a professional training to sons of manufacturers hitherto compelled to pursue their studies abroad, and to complete the training of artisans who have won distinction in branch or provincial colleges, and who, by scholarships from the Institute, or by the aid of their home colleges, of local societies, or of public-spirited individuals, are enabled to avail themselves of the finishing instruction in the Central Institution. Lastly, this college is intended to train a competent body of technical teachers, to diffuse through the land the highest theoretical and practical knowledge of the crafts and industries.

The elementary schools in Britain are subsidized on one hand to teach pure science and art under the guidance and aid of the science and art dept.; on the other hand, to teach scientifically, artistically, and practically, the useful arts, industries, and trades of the country, under superintendence of the City and Guilds of London Institute. The more promising pupils are by means of prizes and scholarships enabled to prosecute their studies at colleges in London and elsewhere, and to complete their technical education in the central institutions. Finally, the students receive diplomas of their attainments, diplomas which are accepted all over the land. Among the most successful of the older art institutions are the Watt Institution (School of Arts), established 1821 at Edinburgh, and Anderson's College at Glasgow.—The Journal of the Soc. of Arts, Reports of the Science and Art Dept., and Reports of Select Committee and the Royal Commission of 1880, contain much interesting information on this subject.

TECHNIQUE, n. *tĕk-nēk'* [F.]: in *art*, the method in which an artist uses his materials to express his conceptions.

TECHNOLOGY, n. *tĕk-nŏl'ŏ-jĭ* [Gr. *technē*, art; *logos*, discourse]: science or systematic knowledge of the industrial arts. In its widest sense it would embrace the whole field of industry, but it is generally restricted to the more important manufactures. Technology is not an independent science, with a set of doctrines of its own, but consists of applications of principles established in various physical sciences (chemistry, mechanics, mineralogy, etc.) to manufacturing processes. See TECHNICAL EDUCATION. TECHNOLOGICAL, a. *tĕk'nō-lŏj'ĭ-kăl*, pert. to a description of the arts, or of the terms used in the arts. TECH'NOLOG'ICALLY, ad. *-lĭ*. TECHNOLOGIST, n. *tĕk-nŏl'ŏ-jĭst*, one who discourses or treats of the arts, or of the terms of art.

TECHNOL'OGY, MASSACHUSETTS INSTITUTE OF. See MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

TECHNOLOGY, SCHOOLS OF: schools of technology in the United States are of comparatively recent date. The earliest was the Rensselaer Polytechnic Institute of Troy, N. Y., founded in 1824; then followed the Massachusetts Institute of Technology, Boston, Mass., 1861; the Worcester Polytechnic Institute, Worcester, Mass., 1868; Lehigh University, 1866; Stevens Institute of Technology, 1871; and the Case School of Applied Science, in 1880 (q.v.). From that time on the number has increased rapidly. There are at present 43 institutions in the United States classed as schools of technology by the commissioner of education. Among these are privately endowed institutions, like the Stevens Institute of Technology; state institutions, like the Sibley College of Cornell University; scientific departments of older universities, and schools partly industrial, like the Pratt and Armour institutes.

Technical schools in Germany are graded as (1) elementary industrial schools; (2) secondary industrial schools; (3) higher polytechnic institutes. There is no such systematic grading in the United States. 'The tendency is toward providing all needed forms of education, including more or less technical training, in connection with a university. Many of the state colleges are affording in one institution the whole range of pure and applied science.' The requirements for entrance to most of the technical schools of the United States are algebra, plane geometry, English literature, the history of the United States, French, or German, and a knowledge of the common English branches. Some schools require solid geometry, plane trigonometry, elementary physics, and chemistry, and some require Latin, in addition to the above. The general courses of study pursued are civil engineering, mechanical engineering, electrical engineering, mining engineering, architecture, and chemistry. The length of each course is usually four years. Marine engineering forms an additional course in the University of Maine, University of Michigan, Cornell,

Columbia, and New York universities. Sanitary engineering is offered as a course in eleven schools, but in only two at present, are students reported as enrolled. Naval architecture is offered as a course in the Massachusetts Institute of Technology, in Columbia, New York, and Cornell universities, and in the University of Michigan. Railway engineering is offered as a course in Yale, Cornell, and Columbia universities, and in the Universities of Illinois and Minnesota. Schools of forestry are connected with Yale, Michigan, Cornell universities; with the University of Nebraska, and the Ohio State University. Horticulture is taught in Harvard University, Ohio State University, Iowa State College, and University of Nebraska. Domestic art, domestic science, and the fine arts, in addition to steam and machine design, and applied electricity, are given prominence in Pratt Institute, Brooklyn, N. Y. At the Armour Institute, Chicago, Ill., typewriting, music, and domestic art are added to the usual engineering courses. The two latter schools are of an individual type.

Schools of Agriculture and Mechanic Arts.—The pioneers of technical education in the United States were the privately endowed schools of technology, but technical education received its greatest impulse by the 'land grant act' and 'Morrill bill' of congress from the year 1862 to 1890. Under these acts the federal government has given 150,000,000 acres of public lands for the establishment and maintenance of colleges of agriculture and mechanic arts. The name has not always been retained, as acts of state legislatures, and private benefactions and other causes have led to a change, or to an affiliation with state institutions. But as a result, at least one such institution has been established, and is now in operation in each state and territory of the United States, except Alaska. Of the 65 institutions that have been organized under these acts, 27 are colleges of agriculture and mechanic arts, and 19 are universities having departments of agriculture and engineering. Separate institutions for colored students have been established in eight southern states, leaving 11 unclassified. The courses of study pursued in these schools are agriculture, civil engineering, electrical engineering, chemistry, mining engineering, textile engineering (in North Carolina and Mississippi); forestry (in Michigan); and horticulture (in Washington and Virginia). Clemson Agricultural College, in South Carolina, has a full equipment of cotton machinery for illustrating the manufacture of yarn and woven fabrics. Requirements for entrance vary greatly in different states. The average standard, as recommended by a committee in 1896 was as follows: Physical geography, United States history, arithmetic, algebra, as far as quadratics, English grammar and composition, plane geometry, one foreign language, one natural science, ancient, general, or Eng-

lish history. While there are some institutions which have not come up to this standard of admission, there are others whose standard is much higher, requiring a preparation comparable with that of admission to the highest literary or scientific universities.

General Statistics.—The number of technical students in the United States is about 30,000, divided as follows: Students in mechanical engineering, 6,363; in civil engineering, 4,734; in electrical engineering, 3,293; in mining engineering, 1,837; in chemistry, 858; in agriculture, 3,472; in architecture, 358; in sanitary engineering, 30; in the study of general sciences, 7,393. Women are reported as attending 27 out of 43 schools of technology. Number of women, 2,462. Number of men, 16,984. The following is the list of schools of technology in the United States: Alabama Polytechnic Institute; Colorado Agricultural College; Colorado State School of Mines; Connecticut Agricultural College; Georgia School of Technology; Armour Institute of Technology; Purdue University; Rose Polytechnic Institute; Iowa College of Agriculture and Mechanic Arts; Kansas State Agriture College; United States Naval Academy; Massachusetts Agricultural College; Massachusetts Institute of Technology; Worcester Polytechnic School; Michigan Agricultural College; Michigan College of Mines; Mississippi Agricultural and Mechanical College; Montana College of Agriculture and Mechanic Arts; Montana State School of Mines; New Hampshire College of Agriculture and Mechanic Arts; Stevens Institute of Technology; New Mexico College of Agriculture and Mechanic Arts; New Mexico School of Mines; Clarkson School of Technology; Rensselaer Polytechnic Institute; United States Military Academy; Agricultural and Mechanical College for the Colored Race; North Carolina College of Agriculture and Mechanic Arts; North Dakota Agricultural College; Case School of Applied Science; Oklahoma Agricultural and Mechanical College; Oregon State Agricultural College; Rhode Island College of Agriculture and Mechanic Arts; South Carolina Military Academy; Clemson Agricultural College; South Dakota Agricultural College; South Dakota State School of Mines; Texas Agricultural and Mechanical College; Utah Agricultural College; Virginia Agricultural and Mechanical College; Virginia Military Institute; Washington Agricultural College. This list, which is reported by the commissioner of education of the United States, does not include a number of schools affiliated with institutions of broader scope, and which are properly described above, as schools of technology; as well as those which combine industrial with technical training; the latter will be found in government reports, under another classification. For detailed information regarding technical schools of the United States, consult: A monograph by T. C. Mendenhall; and *Agricultural and Technical Education* (in Butler, *Education in the United States,*

Vol. II.); *Annual Report of the United States Commissioner of Education; Report of the United States Commissioner of Labor on Trade and Technical Education; Annual Reports* of the Society of Mechanical Engineers.

TECK, *tĕk:* formerly a duchy in Swabia, named after a famous castle, of which ruins still exist; acquired by the House of Hapsburg in the 11th c.; and sold to the Duke of Würtemberg in the 14th c.; now source of the title of a ducal family connected by marriage with the royal family of England.

TECTIBRANCHIATE, n. *tĕk'tĭ-brăng'kĭ-āt* [L. *tectus,* covered; Gr. *brangchĭa,* gills]: one of an order of mollusks having the branchiæ or gills covered, or partly covered, by the mantle; one of the *Tectibranchiata;* ADJ. having covered gills. TECTIBRANCHIATA, order of gasteropodous mollusks, having the gills arranged only on one side, resembling pinnatifid leaves, and covered by the mantle and a small shell, sometimes hardly observable; in other species conspicuous, as in the Bubble-shells (*Bulla*). The tectibranchiata feed mostly on seaweeds, but some eat also animal substances. To this order belongs the Sea-hare of the Mediterranean (*Aplysia depilans*), sometimes 12 inches in length, and in former times an object of superstitious dread, on account of its grotesque form, and of a violet-colored fluid which it ejects from the inner surface of the mantle when molested, and which was supposed poisonous.

TECTONICS, n. plu. *tĕk-tŏn'ĭks* [L. *tectonĭcus;* Gr. *tektonĭkos,* of or belonging to building, architectural—from *tektōn,* a builder]: the art of construction; the art by which vessels, implements, and dwellings and other edifices, are formed agreeably to the end for which they are designed, and at the same time in conformity with artistic ideas. TECTON'IC, a. *-ĭk,* of or pertaining to building or architecture.

TECTRICES, n. plu. *tĕk'trĭ-sēz* [L. *tectus,* covered—from *tegĕrĕ,* to cover]: the feathers which cover the quill-feathers and parts of the wing of a large bird.

TECUMSEH, *tė-kŭm'sėh,* or TECUMTHA, *tė-kŭm'tha:* about 1770-1813, Oct. 5; b. near Springfield, O.; chief of the Shawnee Indians. He went on the war-trail early in life; led the Indians in the campaign with the Ky. militia about 1791; was in the battle of Mad river and the attack on Fort Recovery 1794; and joined his brother, Elskwatawa, the 'prophet,' in the attempt to organize all the Indians in the west against the whites 1805. A large force of Indians, whom he had collected on the upper Wabash, was defeated by Gen. William Henry Harrison at Tippecanoe 1811, Nov. 7, while commanded by Tecumseh's brother during his own absence among the Indians in the south. Tecumseh then took a band of Shawnees to Canada, became an ally of the British, who gave him the rank of brigadier-general, and

was joint-commander with General Proctor at the siege of Fort Meigs. He was in the battle of Lake Erie, and commanded the right wing of the British in the battle on the Thames. In the midst of this battle he stripped himself of his uniform, put on his hunting-costume, and was soon afterward shot dead. Consult: Drake, *Life of Tecumseh and his Brother, the Prophet, with an Historical Sketch of the Shawnee Indians* (Cincinnati, 1841); Eggleston, *Tecumseh and the Shawnee Prophet* (New York, 1878).

TECUMSEH, Mich.: village in Lenawee co.; on the Raisin River, and on the L. S. & M. S., and the C. J. & M. R. R.'s; about 30 miles southeast of Jackson and 12 miles northeast of Adrian. It is in an agricultural region noted for its fruits, especially peaches. The chief manufactures are flour, furniture, wagons, carriages, brick, tile, paper, lumber, foundry and machine-shop products, and dairy products. It has a high school, graded schools, and a public library. The two state banks have a combined capital of $70,000. Pop. (1900) 2,400; (1910 est.) 2,600.

TECUMSEH, Neb.: city, county-seat of Johnson co.; on the Big Nemaha River, and on the Burlington and Missouri River Railroad; about 50 miles southeast of Lincoln, and 60 miles south of Omaha. It is in a rich agricultural region. It is the commercial centre of a large portion of the county; the chief shipments are grain, live stock, vegetables, and fruit. The city has eight churches, a high school, four public school buildings, and a public library. There are two banks, a national and a state, with a combined capital of $100,000. Pop. 2,100.

TED, v. *tĕd* [Swiss, *zetten,* to separate into small parts: Bav. *zetten,* to strew: W. *tedu,* to stretch: Norw. *tedja,* to spread manure]: to turn or spread out (hay or new-mown grass). TED'DING, imp.: N. the act of shaking up or spreading, as in hay-making. TED'DED, pp.: ADJ. spread out to dry, as grass for hay. TED'DER, n. *dĕr,* an implement for turning and spreading out new-mown hay.

TEDDER, n. *tĕd'dĕr:* OE. for TETHER.

TEDE, n. *tēd* [L. *tæda,* a torch]: in *OE.,* a torch.

TE DEUM, n. *tē dē'ŭm* [L. *te,* thee, *Dĕum,* God]: ancient Christian hymn in Latin; named from its first words, '*Te Deum laudamus*'—'We praise Thee, O God;' sung on occasions of triumph and thanksgiving; also in the ordinary service (Rom. Cath. and Prot.) as an offering of high praise. It is at once one of the most simple and one of the most solemn and majestic of all Christian hymns—combining with its strains of noble praise a grand confession of the common faith, and a humble supplication for pardon and grace. Its author and date are unknown: it is probably a compilation from a morning hymn of the early church dating from near the time

of the apostles. It is traceable in a few of its materials to the middle of the 3d c. or earlier; and some have deemed its present form a compilation by Ambrose, Bp. of Milan, for the baptism of Augustine about 387; hence it is called sometimes the Ambrosian Hymn. Its echoes of Holy Scripture have for their key-note Is. vi. 3, with Rev. iv. 8, v. 13. It forms part of the daily 'Matins' of the Roman Breviary, and is recited at the end of 'Matins' on all festivals, and on all Sundays except those of Advent and Lent, to which, as being seasons of penance, the *Te Deum* is considered inappropriate.

TEDIOUS, a. *tē'dĭ-ŭs* [L. *tædĭum*, weariness, disgust—from *tædet*, it offends or wearies]: wearisome from slowness or prolixity; tiresome; irksome; dilatory. TE'DIOUSLY, ad. *-lĭ*. TE'DIOUSNESS, n. *-nĕs*, the quality of being tedious; tiresomeness; prolixity; length. TE'DIUM, n. *ŭm*, irksomeness; wearisomeness; distaste from weariness, or from want of mental occupation; tiresomeness.—SYN. of 'tedious': irksome; troublesome; fatiguing; dilatory; tardy; sluggish; wearisome; tiresome; prolix; slow; wearying.

TEE, n. *tē:* the umbrella-like figure used as a finial on Buddhist topes; any pointed object; an umbrella in general, in the E. Indies.

TEE, n. *tē* [Icel. *tia*, to point out, to mark]: a mark set up in playing at quoits; the nodule from which the ball is struck in golf; in *curling*, the mark in the ice toward which the stones are hurled—also called the TOZEE. TO TEE, as a ball, in *golf-playing*, is to raise it slightly on a projecting bit of earth or turf before giving it the stroke in the direction wished.

TEE, or T, *tē*, in DONE TO A TEE or T [alluding to the nice measurements of a T-square]: done exactly; done to a nicety.

TEEL'-SEED. See OILS; RAMTIL.

TEEM, v. *tēm* [AS. *teàm*, anything following in a row, race, progeny: Low Ger. *toom*, progeny (see TEAM)]: to bring forth, as young; bring forth plentifully; to be fruitful or prolific; to be pregnant; to be full; to produce in abundance. TEEM'ING, imp.: ADJ. producing in abundance; fruitful; prolific. TEEMED, pp. *tēmd*.

TEEM, v. *tēm* [Scot. *toom*, empty, void: Dan. *tom;* Icel. *tómr*, empty: Gael. *taom*, to empty, to pour out]: in *OE.*, to pour out; to unload, as a cart. TEEM'ING, imp. TEEMED, pp. *tēmd*. See TOOM.

TEEN, n. *tēn* [AS. *teona*, injury]: in *OE.*, sorrow; trouble; mischief: V. to grieve; to excite; to provoke.

TEEN, v. *tēn*, or TEEND, v. *tēnd* [Dan. *tænde;* Sw. *tända*, to kindle]: in *prov. Eng.*, to light, as a candle. TEEN'ING, imp. TEENED, pp. *tēnd*.

TEENS, n. plu. *tēnz* [from *ten*]: years of one's age

ending in *teen*—from thirteen to nineteen—as, a girl in her *teens*.

TEES, *tēz:* river in northern England, 90 miles long, flowing eastward, and forming the boundary between the counties of Durham and York. It enters the North Sea ten miles below Stockton, to which town it is navigable for vessels of 60 tons.

TEETH, n. *tēth* [plu. of TOOTH (q.v.)]: small enamelled bones fixed in the lower and upper jaws; used for chewing, biting, cutting, or tearing (see below). TEETH, v. *tēth*, to breed or form teeth. TEETH'ING, imp.: N. the process of the first growth of teeth, called *dentition* (see DENTITION, PERIOD OF). TEETHED, pp. *tēthd.* IN SPITE OF HIS TEETH, contrary to his wishes and fixed resolution. TO THE TEETH, in opposition. TO CAST IN THE TEETH, to retort; to reproach. TO SHOW THE TEETH, to threaten.—*Teeth* are small enamelled bones fixed in the jaws of animals, fitted for chewing, biting, cutting, tearing, etc. A tooth is described by Prof. Owen as 'a hard body attached to the mouth or commencement of the alimentary canal, partially exposed when developed. Calcified teeth are peculiar to the vertebrates, and may be defined as bodies primarily, if not permanently, distinct from the skeleton, consisting of a cellular and tubular basis of animal matter containing earthy particles, a fluid, and a vascular pulp.' The same writer says: 'In some species, they are modified to serve as formidable weapons of offense and defense; in others, as aids in locomotion, means of anchorage, instruments for uprooting or cutting down trees, or for transport and working of building materials. They are characteristic of age and sex; and in man they have secondary relations, subservient to beauty and to speech. Teeth are always intimately related to the food and habits of the animal, and are therefore highly interesting to the physiologist; they form, for the same reason, important guides to the naturalist in the classification of animals.'

True teeth consist of one, two, or more tissues, differing in chemical composition and microscopical appearances. 'Dentine' forms the body of the tooth; 'cement' forms the outer crust of the root; 'enamel' covers the dentine of the crown. The *dentine*, divided by Prof. Owen into hard or true dentine, vaso-dentine, and osteodentine, consists, according to his view, of an organized animal basis, disposed in the form of extremely minute tubes and cells, and of earthy particles; these earthy or calcareous particles being either blended with the animal matter of the interspaces and walls of the tubes and cells, or contained in a minutely divided state in their cavities. The tubes and cells contain, besides the calcareous particles, a colorless fluid, which is probably transuded blood plasma, or *liquor sanguinis*, and contributes to the nutriment of the dentine. In hard or true dentine, the *dentinal tubes* proceed from the hollow known as the

pulp-cavity, in a slightly wavy course, nearly at right angles to the outer surface (see fig. 1). 'The hard substance of the tooth is thus arranged in hollow columns, perpendicular to the plane of pressure, and a certain elasticity results from these curves; they are upright where the grinding surface of the crown receives the appulse of the opposing tooth, and are horizontal where they have to resist the pressure of contiguous teeth. The tubuli, besides fulfilling the mechanical ends above stated, receive the plasma transuded from the remains of the vascular pulp, which circulates by anastomosing branches of the tubuli through the dentine, maintaining a sufficient though languid vitality of the system. The delicate nerve-branches on the pulp's surface, some minute production of which may penetrate the tubuli, convey sensations of impressions affecting the dentine—sensations whose acuteness is experienced when decay has affected the dentine, or when mechanical or chemical stimuli have "set the tooth on edge;" but true dentine has no canals large enough to admit capillary vessels with the red particles of blood.' When a part of the primitive vascular pulp from which the dentine is developed remains permanently uncalcified, red blood is carried by 'vascular canals' into the substance of the tissue. Such dentine is called *vaso-dentine*, and is often combined with true dentine in the large incisors of certain rodents, the tusks of the elephant, and the molars of the extinct megatherium. Another modification of the dentine is when the cellular basis is arranged in concentric layers around the vascular canals, and contains 'radiated cells,' like those of bone: this is termed *osteo-dentine*, and resembles true bone very closely. The *cement* always corresponds in texture with the osseous tissue of the same animal, and wherever it occurs in sufficient thickness, as on the teeth of the horse or ox, it is traversed like bone by vascular canals. Moreover, when the osseous tissue contains minute radiated cells, precisely similar cells are likewise in the canal, and constitute its most marked characteristic. The relative densities of dentine and cement vary according to the amount of earthy matter.

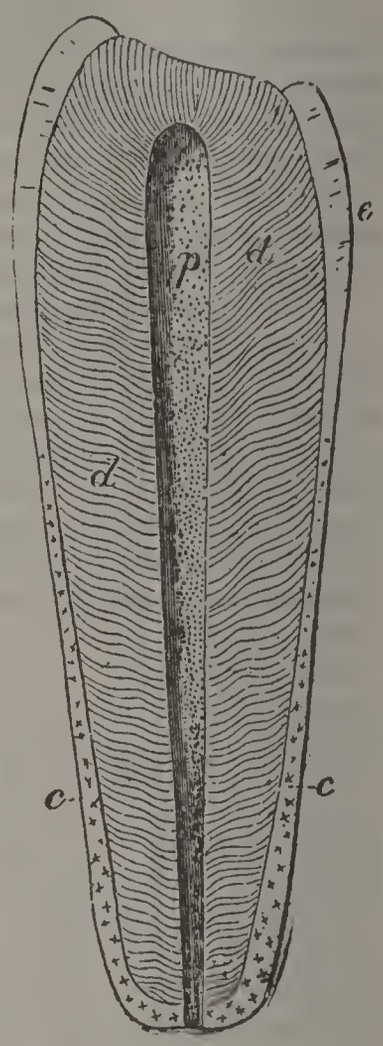


Fig. 1.—Section of Human Incisor Tooth, magnified:

c, *c*, the cement; *d*, *d*, the dentine; *e*, *e*, the enamel, partly chipped off on the crown; *p*, the pulp-cavity.

In the complex grinders of the elephant and some other animals, the cement, which forms nearly half the mass of the tooth, wears down sooner than the dentine. The *enamel* is the hardest of all the animal tissues, and contains no less than 96·4 per cent. of earthy matter (mainly phosphate of lime), while dentine contains only 72 per cent., and cement and ordinary bone only 69 per cent., of earthy matter. The earthy matter is contained in comparatively wide canals, composed of animal membrane of extreme tenuity.

In tracing the teeth upward from their simplest to their

Fig. 2.—Magnified Section of a Molar Tooth of the Megatherium. *v*, vaso dentine; *d*, dentine; *c*, cement.

most complicated forms, we find a very few examples (solely among fishes, e.g., the wrasse) in which teeth consist of a single tissue—a very hard kind of non-vascular dentine. Teeth consisting of dentine and vaso dentine are very common in fishes, the hard dentine being external, and performing the office of enamel. Dentine and cement, the latter forming a thick outer layer, constitute the grinding teeth of the dugong. In the teeth of the sloth, the

hard dentine is reduced to a thin layer, and the chief bulk of the tooth consists of vaso-dentine internally and a thick crust of cement externally. 'The human teeth and those of the carnivorous mammals appear at first sight to be composed of dentine and enamel only; but their crowns are originally, and their fangs are always, covered by a thin coat of cement. There is also commonly a small central tract of osteo-dentine in old teeth. The teeth called compound or complex in *Mammalia* differ as regards their composition from the preceding only by the different proportion and disposition of the constituent tissues. Fig. 3 is a longitudinal section of the incisor of a horse; *d* is the dentine, *e* the enamel, and *c* the cement, a layer of which is reflected into the deep central depression of the crown; *s* indicates the colored mass of tartar and particles of food which fills up the cavity, forming the "mark" of the horse-dealer.'—*Organic Nature*, I. 267. Far more complex forms of teeth than this may be produced by peculiar arrangements, chiefly inflections, of the tissues. Certain fishes, and a family of gigantic extinct batrachians to which Owen has, from this remarkable peculiarity, given the name *Labyrinthodon* (q.v.), exhibit this kind of complexity in remarkable degree. Another kind of complication is produced by an aggregation of many simple teeth into a single mass. These compound teeth are most frequent in fishes, but are occasionally found in mammals. In the elephant, the compound molars belong to this class, the denticles being in the form of plates vertical to the grinding surface, and transverse to the long diameter of the tooth. When the tooth is bisected vertically and longitudinally, the three substances, dentine, *d*, cement, *c*, and enamel, *e*, are blended (see fig. 4).

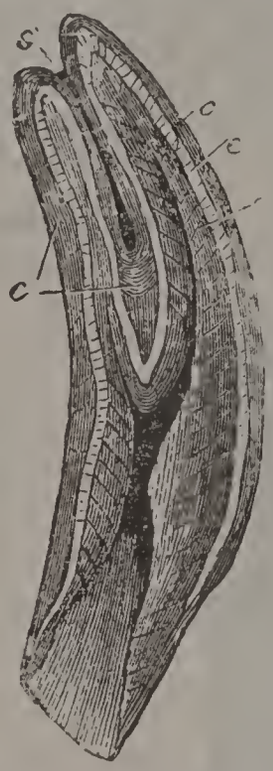


Fig. 3.—Longitudinal Section of the Incisor of a Horse.

In *fishes*, the teeth, as regards number, form, substance, structure, situation, or mode of attachment, offer a greater and more striking series of varieties than those of any other class of animals. In all fishes, the teeth are shed and renewed, not once only, as in mammals, but frequently during their whole lives; and, as Prof. Owen observes, 'this endless succession and decadence of the teeth, together with the vast numbers in which they often co-exist in the same fish, illustrate the law of vegetation or irrelative repetition as it manifests itself on the first introduction of new organs in the animal kingdom.' While comparatively few fishes are entirely devoid of teeth, we find, in the class of *Reptiles*, that the whole order of *Chelonia* (tortoises and turtles), the family of toads (*Bufonidæ* in the order *Batrachia*), and certain extinct genera of *Sauria* (lizards), are toothless. Frogs have teeth in the upper, but not in the

lower jaw. Newts and salamanders have teeth in both jaws and on the palate; and teeth are found on the palate as well as on the jaws of most serpents. In most lizards, and in crocodiles, the teeth are confined to the jaws. The teeth in reptiles are mostly simple, of conical form, and adapted, as in most fishes, for seizing and holding, but not for dividing or masticating, the food. In no reptile does the base of the tooth branch into fangs; and, as a general

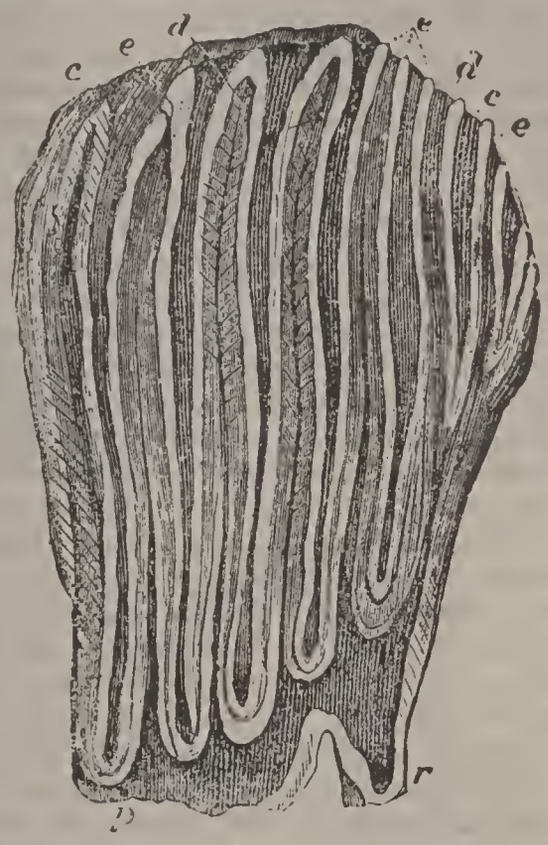


Fig. 4.—Longitudinal Section of Part of an Elephant's Grinder:

c, the cement; *d*, the dentine; *e*, the enamel; *p*, the common pulp-cavity; *r*, one of the roots of this complex tooth.

rule, the base of the tooth is anchylosed to the bone which supports it. The completion of a tooth is soon followed by preparation for its removal and succession, the faculty of developing new tooth-germs seeming unlimited in this class. For further details regarding the teeth of fishes and reptiles, see Prof. Owen's *Anatomy of the Vertebrates*, 1866, I 359–409.—Birds have no teeth.

Mammals include a few genera and species devoid of teeth. The true Ant-eaters (*Myrmecophaga*), the Pangolins or Scaly Ant-eaters (*Manis*), and the Spiny Monotrematous Ant-eater (*Echidna*), are strictly toothless. The Ornithorhynchus has horny teeth, and the Whales (*Balæna* and *Balænoptera*) have transitory teeth, succeeded in the upper jaw by whalebone. The female Narwhal exhibits nothing more than the germs of two teeth in the substance of the upper jaw; in the male, one of these germs becomes developed into the remarkable weapon which specially characterizes the animal, and to which its

generic term *Monodon* (single tooth), is due. In the Great Bottle-nose Whale, in the adult state, there are only two teeth (in the lower jaw); whence the name *Hyperoödon bidens*. The Elephant has never more than one entire molar, or parts of two, in use on each side of the upper and lower jaws; to which are added two tusks, which are modified incisors, more or less developed, in the upper jaw. Some rodents have 2 grinders on each side of both jaws, which, added to the 4 cutting-teeth in front, make 12 in all; but the usual number of teeth in this order is 20, though Hares and Rabbits have 28 each. The number of teeth, 32, which characterizes man, the apes of the old world, and the true ruminants, is the average one in the class Mammalia; but, according to Prof. Owen, 'the typical number is 44.' 'I have been led,' he observes, 'chiefly by the state of the dentition in most of the early forms of both carnivorous and herbivorous mammalia which flourished during the eocene tertiary periods, to regard 3 incisors, 1 canine, and 7 succeeding teeth, on each side of both jaws, as the type-formula of diphyodont dentition.' Prof. Owen divides the class Mammalia, in regard to the times of formation and the succession of their teeth, into the *Monophyodonts* (Gr. *mŏno-*, once; *phy-*, generate; and *odont*, tooth), or those that generate a single set of teeth, e.g., the sperm whales, dolphins, porpoises, armadillos, and sloths; and the *Diphyodonts* (from *di*, twice, etc.), or those that generate two sets of teeth, as the Mammals generally, with the above exceptions. A few of the Monophyodonts have 80 to 100 teeth. See MAMMALIA. The hog, the mole, the gymnure, and the opossum, are among the few existing quadrupeds which retain the typical number and kinds of teeth. For the formula expressing the number of the different kinds of teeth—viz., the incisors or cutting-teeth, the canines or dog-teeth, the premolars, and the molars or true grinders—commonly known as the *dental formula*, see DENTITION, in which article the *milk* or *deciduous* teeth, and the order in which they appear, also are described. It is only in the Mammals that we have a well-marked division of the teeth into the four kinds—incisors, canines, premolars, and molars. Each is now to be briefly described.

The *incisors*, or cutting-teeth, are in front, and have a single conical root or fang, and a vertical crown bevelled behind, so as to terminate in a sharp cutting edge. These teeth are specially fitted for cutting the food. In man, there are two of these incisors in each side of each jaw. In herbivorous animals, they crop the herbage; in rodents (rabbit, hare, rat, beaver, etc.), these teeth are very much developed, and differ from any other teeth in Mammals in this respect, that their growth continues through life; and if their length does not constantly increase, it is because their free extremity or edge is worn down by trituration as fast as they grow at the base from their roots.

The *canines* (so called from their prominence in the dog) are next to the incisors. Their crown is rather conical than wedge-shaped, and their fang sinks more deeply into

the jaw than that of the incisors. In all carnivorous animals, they are largely developed, being formed obviously for tearing the flesh of their prey. In man, there is one canine tooth in each half-jaw; and there is never more than this number in any of the lower animals.

The *premolars* (known also as bicuspids and false molars) are next in order to the canines; they are smaller than the latter, and their crown presents two pyramidal eminences. In man, there are two premolars in each half-jaw. Their function approaches more nearly that of the true molars behind them, than that of the canines.

The *true molars* (or multicuspids) are placed most posteriorly. They are remarkable for comparatively great size, for the square form of the upper surface on which are

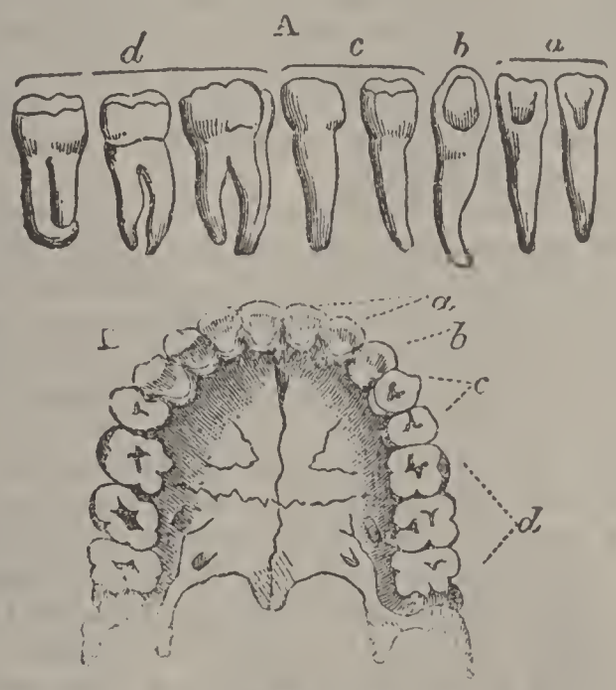


Fig. 5.

A, the separate human teeth as they occur in the half-jaw of the adult; B, the human teeth *in situ* in the upper jaw; *a*, *a*, incisors; *b*, *b*, canine; *c*, *c* premolars; *d*, *d*, true molars.

from three to five elevations or cusps, and for their short root divided into two to five branches, each perforated at its extremity. In man, there are three molars in each half-jaw, the posterior one being termed the wisdom-tooth, from its being cut the latest: they are employed especially for grinding the food, under the action of the muscles of the lower jaw.

The teeth are so admirably adapted for the special purposes which they are to fulfil that it is generally easy, from careful examination, to say to what class of animal they belong, and to draw various conclusions regarding the habits and structure of the class generally. Thus, in carnivorous animals, the molars are not grinding-teeth, but present sharp cutting edges, and those of the upper and lower jaw overlap each other; resembling a pair of

scissors in their action. In insectivorous animals, the molars have a tuberculated surface, with conical points and depressions, so arranged as to lock into each other. In frugivorous animals, living on soft fruits, these teeth are provided with rounded tubercles, while in herbivorous animals, they have a broad, rough surface, resembling a millstone.

There is also a close connection between the articulation or joint of the lower jaw and the nature of the food used by the animal. Thus, in purely carnivorous animals, in which the teeth simply tear and cut the food, no grinding motion is required, and the jaw is capable only of a simple hinge-motion in the vertical plane; while in herbivorous animals the joint is so constructed as to allow of extensive sliding and lateral motion of the lower molar teeth upon the upper. In man, both the form of this articulation and the general character of the teeth point to an intermediate position in relation to food, and form a good physiological argument for the mixed diet which general custom has decided to be most favorable and natural to our species.

Diseases of the Teeth.—For the dangers to which infants and children are exposed in the process of teething, see Dentition. The following remarks concern the most important affections of the permanent teeth.

1. *Caries of the teeth* usually begins in the dentine immediately below the enamel, a yellow or brown spot being observed on the surface of the tooth over the affected part. The tissue soon becomes softened, and a small cavity is formed, which, after a time, presents an external opening, in consequence of the unsupported enamel giving way. The substance of the tooth now decays more rapidly, and the caries gradually approaches the central or pulp cavity, which at length is opened. Hitherto there has been little or no suffering, but now pain is experienced under the action of irritant substances, heat, cold, etc. Inflammation, proceeding to suppuration, takes place; the pulp is gradually destroyed by ulceration; and the body of the tooth, thus deprived of nourishment, decays, and leaves nothing but the outer coating of enamel, which then breaks away by degrees, till nothing but the fangs of the tooth remain, and these usually cease to give pain. Caries is not only a common cause of toothache, but also frequently gives rise to obstinate headache, pain in the ear, deafness, squinting, impossibility of bearing the light (photophobia), and other anomalous symptoms, which immediately disappear on removal of the diseased tooth. In these cases, the tooth may never have ached, but will be found painful when pressed up or smartly struck. The primary cause of caries is constitutional, and it occurs especially in scrofulous and ill-nourished persons, or in those whose health is broken down by too frequent pregnancies, prolonged lactation, abuse of mercury, etc. The direct or exciting

causes are usually described as: (1) such as destroy the integrity of the enamel, and thereby expose the dentine to the influence of irritant substances; or (2) such as operate on the vital susceptibilities of the dental tissues. Among the former are acids and other corrosive substances taken into the mouth, sour eructations, acid secretions of bacteria, attrition of opposing surfaces of the teeth, and all kinds of mechanical violence; while among the latter are hot and cold drinks, especially in quick alternation. The excessive use of sugar also is commonly regarded as a cause. Many of the best dentists, however, deny that acids (taken medicinally) or that the abrasion of the enamel can give rise to caries.

As to treatment: if the caries be slight and recent, the decayed portion must be removed, and the cavity filled with gold or amalgam (see DENTISTRY). 'But, if the decay has advanced far toward the pulp-cavity, or has laid that open, it may be necessary first to employ aperients and tonics, and use some application to deaden the sensibility of the tooth, so as to enable it to bear the stopping, and to protect it meanwhile from contact with food and saliva.'

2. *Necrosis* is characterized by blackness of the tooth and looseness in its socket: it may be caused by violence, accompanied with destruction of the nutrient vessels, or by inflammation of the pulp. If the tooth gives trouble, it must be extracted. Necrosis of the teeth is distinct from the very destructive necrosis of the dental alevolar processes and of the jaws generally, which results from the poisonous action of phosphorus fumes, or from the very similar affection which sometimes follows the eruptive fevers. For an account of the singular and terrible disease from which artisans employed in making lucifer-matches suffer, from inhaling the fumes of phosphorus (probably in the form of phosphorous acid), see PHOSPHORUS. The necrosis and exfoliation of the alveolar processes and portions of the jaws in children, consequent on the eruptive fevers, are accompanied by shedding of the teeth, and are considered essentially the same as the necrosis in phosphorus-poisoning, and, like it, the result of local application of a specific poison, generated within the individual, to the vascular parts of the teeth.

3. *Alveolar abscess* is a suppuration around the fang or fangs of a tooth, usually carious, accompanied by absorption of the bony walls of the aveolar process, and enlargement of the little sac of pus or matter, which gradually makes its way to the surface, 'either along a canal by the side of the fang of the tooth opening at the edge of the gum, or through the gum itself at a point corresponding to the end of the root (or roots) of the tooth implicated. When, however, the fangs are unusually long, or the reflection of the mucous membrane from the gum to the cheek or lip is very superficial, this same dis-

charge may burrow still more outwardly, and find its exit on the surface of the face.' When the discharge bursts, as it usually does, through the gum, the alveolar abscess is reduced to its simplest form, and is known as a *gum-boil*. When the discharge takes place in the region of the cheek or chin, the true nature of the case may easily be mistaken by a careless surgeon, who might refer the symptoms to bone-disease. The cause of this affection is either caries or necrosis. In its earliest stage, the disease may be cut short by extraction of the affected tooth, or even by the removal of the stopping, if the tooth is a stopped tooth. To save a threatened tooth, hot fomentations should be applied to the swollen part of the face, and the system should be briskly purged. As soon as matter can be detected, it should be allowed to escape by a puncture through the gum—an operation followed by immediate relief, and by rapid subsidence of the swelling, though pus continues to be discharged for a considerable time.

4. *Toothache* is not so much of a disease as a symptom of various morbid states of the affected part. According to the various conditions which give rise to it, toothache may be divided into: (*a*) *Inflammatory toothache,* which is almost always dependent on caries. The inflammation may be seated in the pulp of the tooth, in the nerve-twig entering the pulp-cavity, or in the periosteum investing its roots, and reflected over the interior of the alveolar cavity. There is generally some external swelling after the pain has continued some time, and it occasionally extends to the salivary glands. The tooth is at the same time very tender, and any force applied to it aggravates the pain, which is increased also by hot and cold liquids taken into the mouth. When, as in the great majority of these cases, the pain is associated with caries, the best treatment, according to an authority on this subject, is as follows: Let the patient have a strongly purgative dose; confine him to spoon-diet; let him wash out the mouth with a solution of carbonate of soda in tepid water; let the gum around the tooth, and between it and its neighbors, if tumid and tender, be deeply scarified with a fine lancet; then let the cavity be filled loosely with a little cotton-wool, dipped into the solution of tannin and mastic (see the formula above); this will usually cure if the toothache be curable. If the pain is very violent, half a grain of powdered acetate of morphia may be taken up with the cotton imbued with the tannin, which should be warmed before it is put into the cavity. As soon as the pain is relieved, the tooth should be stopped with gold or amalgam. Most of the violent, burning, empirical nostrums, e.g., creosote, oil of thyme, etc., though they may be of service when introduced in small quantity by a skilful hand into the carious tooth at the right time, can do nothing but mischief when used indiscriminately. (*b*) *Neuralgic toothache* may occur

either in sound or in carious teeth: it may be recognized by its occurrence in paroxysms at more or less regular intervals, and by its being attended with little or no swelling of the external parts. It is very common in earlier months of pregnancy, and in persons of general neuralgic tendency, and is often excited by changes in the weather. The treatment is the same as for neuralgia generally. After the bowels have been freely opened, chalybeates and quinine must be given in large doses, and frictions with proper tinctures (which a dentist should prescribe) may be carefully applied to the gum. (*c*) *Rheumatic and gouty toothache* may occur in sound or carious teeth in rheumatic or gouty persons. The constitutional treatment applicable to these diseases must be tried, with the local applications above noticed.

5. *Falling of the teeth,* due to absorption of the socket, may be regarded as almost an ordinary consequence of old age; but it frequently occurs under the popular name *scurvy of the gums* in middle age, though very seldom before the 30th year. True scurvy, gangrene of the mouth, or mercurial inflammation of the gums, may cause the loosening of the teeth at any age; but there are two other conditions which lead to the same result. In one of these affections the gums swell, and assume a deep red color, and the inflammation appears to be propagated into the alveoli, producing a thickening of the periosteum, and a consequent elevation of the tooth above its ordinary level. By frequently recurring attacks of this inflammation, the tooth is lifted out of its socket, while the gum retreats from the neck, and leaves a portion of the roots exposed. The tooth thus deprived of its support at length falls, after which the gum heals, and the patient is relieved. The remedies indicated are those tending to relieve inflammation of the gum, but they are seldom successful. In the other affection, there is conjoined suppuration of the gums and sockets, and the disease shows itself first by an oozing of pus from behind the edges of the gums when they are pressed. From the absorption of the sockets, and the simultaneous retreat of the gums, the teeth, as in the previous case, at length fall out, if they have not, for the patient's comfort, been previously extracted.

6. *Painful and difficult eruption* (*cutting*) *of the wisdom-teeth* may be protracted for months or years unless surgical aid is called in. The difficulties 'arise from the position occupied by these teeth, so close to the joint of the lower jaw, where the mucous membrane is reflected from the gums to the cheek and fauces, combined with the very common condition, that the jaw is not sufficiently elongated backward to allow the *dentes sapientiæ* to range in the horizontal series with the other teeth.' This mechanical difficulty not only holds back these teeth in their bony bed, but it often prevents their proper direction of growth. As a consequence of these displacements

in the upper jaw, it often happens that when the jaws are brought together, a bit of mucous membrane is nipped and pinched, leading first to ulceration and extreme tenderness, subsequently to cicatrization and stiffness of the parts. From insufficient room in the lower jaw, the crown only partially emerges through the gum, the first cusp coming through it, while the hinder cusps remain covered. This produces a distressing pinching of the mucous membrane over the tooth every time the jaws are brought in contact. Another troublesome symptom, often associated with the painful cutting of a lower wisdom-tooth, is spasmodic but continuous contraction of the masseter muscle, so as to keep the jaws nearly closed, and capable of only slight separation. The most distressing result, however, is the suppuration that often attends the difficult eruption of the tooth. Even in ordinary cases, when none of these complications are present, there may be much diffuse and erratic pain. The treatment must be left to the dentist.

7. *Hemorrhage after extraction of teeth* has occasionally proved fatal, and is not very rare as a troublesome and even dangerous complication of the operation. In most of the recorded cases there has been distinct evidence of the existence of the hemorrhagic diathesis, or, in other words, of a liability to bleeding profusely from the most trivial wounds.

8. For *Tartar* of the teeth, see that title.

TEETOTALISM, n. *tē-tō′tăl-ĭzm* [for origin, see below, also compare TEETOTUM]: entire abstinence from the drinking of intoxicating (distilled or fermented) liquors. The origin of the word is perhaps threefold. The Rev. Joel Jewell asserts that it originated in the United States (in Hector, Schuyler co., N. Y.) about 1827, when his 'new pledge' of total abstinence began to be substituted for the 'old pledge' of abstinence from spirits, with toleration of wine, beer, cider. On the lists of the persons bound by pledge of abstinence, Joel Jewell, as sec. of the first of such societies in N. Y., began to put the letters O. P. after the names of those bound by the old pledge, and the letter T. after those of persons pledged to total abstinence. From the repeated explanation T. total (i.e., T = total) came the expression T-total, afterward written teetotal.—In England the word came into existence in Lancashire about 1833, through the stammering habit of a zealous advocate of the reform, Richard Turner, artisan of Preston. Quite independently also the word appears to have come into being in Cork, Ireland, through the stammering of one of Father Mathew's early supporters: see TOTAL ABSTINENCE: TEMPERANCE MOVEMENT. TEETO′TAL, a. *-tăl*, pertaining to or practicing teetotalism. TEETO′TALER, n. *-ėr*, or TEETO′TALLER, n. *-lėr*, one pledged to abstain from all use of intoxicating liquors. TEETO′TALLY, ad. *-lĭ*, in *slang*, wholly; entirely.

TEFSA, *tĕf'sâ*, or TADLA, *tâd'lâ*, or TEDLA, *tĕd'lâ:* town in Morocco, 135 m. n.e. of the city of Morocco; in the fertile, well-peopled district of Tadla, on the banks of the Um-er-Beg. It is one of the oldest towns of the country, and its manufactures of woolen cloths and shawls are important.—Pop. (with the small town or suburb Efza) 10,500, of whom 2,000 are Jews.

TEG, or TEGG, n. *tĕg*. a young sheep; a doe in its second year.

TEGMEN, n. *tĕg'mĕn* [L. *tegmen* and *tegmen'tum*, a covering—from *tegĕrĕ*, to cover]: in *bot.*, the second covering of the seed. TEGMENTUM, n. *tĕg-mĕn'tŭm*, in *anat.*, the upper part of the main body of the peduncular fibres of the cerebrum. TEGMEN'TA, n. plu. *-tă*, in *bot.*, the scaly coats which cover leaf-buds.

TEGNÉR, *tĕg-när'*, ESAJAS: Swedish poet, most eminent of Swedish writers: 1782, Nov. 13—1846, Nov. 2; b. Kyrkerud, in the province of Wermland. He was educated at the Univ. of Lund, where he took the degree M.A 1802. In 1805 he was appointed sub-librarian to the univ., and lecturer on æsthetics. In 1811 the Acad. prize was awarded to his poem of *Svea*, or Sweden, which at once raised him to the rank of one of the most popular writers of his country. He had previously written several spirited war-songs and national odes, which had attracted favorable notice. In 1812 he became prof. of Greek, and at the same time (though, it is said, he did not take holy orders) was given the pastoral care of the parish of Stäfje. During the next 10 or 12 years he devoted himself to his clerical duties and to theological learning with an earnestness remarkable in one who had seemed to lack the religious temperament. During this period he composed his two famous religious idyls *Prestvigelsen*, or the 'Consecration of a Priest,' and *Nattvardsbarnen*, or 'The Young Communicants;' and wrote *Axel*, poetic romance regarded by some Swedish critics as even superior to his *Frithiof's Saga*. Of the latter work, the first cantos appeared in a literary journal, the *Iduna*, edited by the historian Gejer, and conducted under the auspices of the Gothic Soc., whose leading object was to foster national literature and put down the prevalent taste for the pedantic classical or foreign style. In 1825 T. published the closing parts of *Frithiof's Saga*, which follows rather too closely the ancient saga. But notwithstanding the inharmonious character of the work—a collection of many ballads and odes in various meters, rather than a complete epic—the *Frithiof's Saga* became the most popular poem of Sweden: indeed, before its completion it had gained a European fame; and its translation into German was urged by Goethe. Though its accuracy in the details of early Scandinavian life is open to criticism, it gives the freshest presentation of the life in an imaginative form. The clergy of the diocese of Wexio evinced their admiration by nominating him for the vacant bishopric, to which the king at once appointed him, 1825. In his place at the diet, he was a conspicuous supporter of ultra-conservative

views, in opposition to the extreme liberal doctrines which formerly he had advocated. His speeches in the chamber and on various public occasions have great reputation in Sweden and Norway: they deal with questions of education, literature, and finance. In 1839 T. was proposed for the archbishopric of Upsala; but in the next year he showed symptoms of insanity, which had afflicted other members of his family. After a few months' confinement in an asylum, he returned to his work; but he had an apoplectic stroke 1843, and, after lingering many months in a paralytic condition, he died. About 1825 he had had an unreasonable and unfortunate love affair.—His collective works, edited by his son-in-law, Prof. Böttiger, were pub., 6 vols. (Stock. 1848). All his larger and more popular poems have been translated into German, French, and English; Eng. translations of *Frithiof* are said to number 19, German 18; and there has been at least one in every European language. Longfellow's transl. is well known; also R. G. Latham's (1838), G. Stephens' (1841).

TEGUCIGALPA, *tā-gô-sē-gâl'pâ:* cap. of Honduras, Central America; on a table-land 3,426 ft. above sea-level, 25 m. s.e. of Comayagua. T. is the largest and finest city in the republic. Near it are gold, silver, and copper mines. —Pop. 12,000.

TEGULAR, a. *tĕg'ū-lĕr*, or TEG'ULATED, a. *-lā-tĕd* [L. *tegŭla*, a roof-tile—from *tego*, I cover]: pertaining to or resembling a tile; consisting of tiles or disposed as tiles, overlapping.

TEGUMENT, n. *tĕg'ū-mĕnt* [L. *tegumen'tum*, a covering —from *tego*, I cover]: in *anat.*, the general covering of the human body; any natural covering or envelope. TEG'UMENT'ARY, a. *-mĕnt'ĕr-ĭ*, pertaining to or consisting of coverings.

TEHEE, int. or n. *tē-hē'* [an imitative word]: a sound made in laughing; a titter: V. to laugh. TEHEE'ING, imp. TEHEED', pp. *-hēd'*.

TEHRAN, *tĕh-rân'*, frequently spelled TEHERAN, *tĕh-hĕr-ân':* city, cap. of Persia and of the province of Irak-Ajemi; 70 m. s. of the shore of the Caspian Sea. It is on a wide plain dotted with mud-built villages, and pierced with many circular pits which reach down to the great subterranean water-courses, on which, in this region, the life of animal and plant is dependent. On the n.e. runs the lofty range of the Elburz Mountains, rising in the noble and graceful Demavend 22,000 ft. above sea-level, and giving dignity to an otherwise tame and unattractive scene. The town consists almost entirely of mud-houses, packed within a mud-wall 20 ft. high, and 4 m. in circumference. The principal buildings are the British and Russian residencies; the bazaar of Taki Khan (finished 1851, cost $150,000). The Ark, or Citadel—in the suburbs—is the shah's palace, and about 2½ m. n. of it is the Castle of the Kajars (Kasr-i-Kajar), the 'Windsor Palace' of the Persian rulers. The streets mostly are narrow, and miserably paved. Carpets are manufactured; but the chief

trades are shoemaking and manufacture of hats and linen goods. Several telegraph lines centre here. In the King's College are about 250 students, with some European professors.—In the vicinity of T. are the ruins of Rei, the *Rhages* of Scripture, known in the time of Alexander the Great under the name *Ragæ*, and the birthplace of Harûnal-Raschid.—Pop. of T. estimated (1902) 250,000; in summer (when those who are able to do so move out to the mountain slope) it is less.—See S. G. W. Benjamin's *Story of the Persians* (Boston 1886); *History of Persia*, by Clements R. Markham (1874).

TEHUANTEPEC, *tā-wân-tā-pĕk′*: river-port of s. Mexico, in the territory of T., 10 m. above the mouth of the river T., in the bay also of T. The inhabitants are engaged in manufacturing salt and cotton fabrics, and in indigo-planting. Pearl-fishing is also carried on. Pop. 15,000.

TEHUANTEPEC, *tā-wân-tā-pĕk′*, ISTHMUS OF: narrowest part of Mexico; between Campeche and Tehuantepec bays; comprising the states of Tobasco and Chiapas and parts of Vera Cruz and Oajaca; minimum breadth, bay to bay 130 m. Its drainage is by the Coatzacoalcos river, which empties into Campeche Bay, and by the Tehuantepec river, which flows into the bay of the same name. It has three natural divisions—the Atlantic plains, the mountainous or central district, and the Pacific plains; and derives its chief importance from its availability as an interoceanic route. In its most constricted port, where it is but 125 miles wide, it forms part of the States of Vera Cruz, and Oaxaca. With the view of constructing a ship canal across the isthmus, it has been surveyed many times; once (1814) the Spanish govt. authorized the opening of a canal there; and later the U. S. govt. (1870–1) had the isthmus surveyed as part of the plan for thoroughly exploring the whole American isthmus. In 1879 a company was organized in Boston, under a Mexican grant, to construct an interoceanic railroad there, and work was carried on for two years, when the grant was revoked, and the Mexican govt. undertook a similar scheme. Meanwhile (1880) a concession was granted to Capt. Eads to construct a ship railway, an ordinary railway, and a telegraph line across the isthmus. The railroad was opened in 1895 with termini at the ports of Coatzocoalcos, in the Gulf of Mexico, and Salina Cruz on the Pacific. See EADS, JAMES BUCHANAN: LESSEPS, FERDINAND DE: INTEROCEANIC SHIP CANAL: INTEROCEANIC SHIP RAILWAY.

TEI′DÆ: see MONITOR.

TE IGITUR, *tē ĭj′ĭ-tĕr* [L., Thee therefore]: one of the service-books of the Rom. Cath. Ch., an extract from the Roman missal, containing the canon of the mass and other portions of the Liturgy which do not vary

with the festivals or the ecclesiastical seasons. It is named from the first words of the canon. This service-book, as distinct from the missal, is used by prelates and other dignitaries; and as the 'canon' is the most sacred part of the service, oaths upon the Te Igitur have been regarded as especially solemn.

TEIGNMOUTH, *tĭn'mŭth:* English seaport, market-town, and favorite watering-place on the s. coast of Devonshire, on the n. side of the estuary of the Teign. In front, on the sea-side, is the wide esplanade known as the *Den,* formed of a huge bank of sand, accumulated in the course of ages at the river's mouth—one of the chief features of the place. The harbor is safe and commodious, though difficult of entrance, the channel of the river being obstructed by a shifting bar of sand. The chief imports are coal and culm; the exports, granite from Dartmoor, and china-clay. There is a sea and river fishery. Teignmouth is connected with Shaldon, on the other side of the river, by a wooden bridge of 34 spans. The climate is mild and salubrious, and the country beautiful. Teignmouth is a station on the South Devon railway. Pop. (1901) 8,638.

TEIL, n. *tēl* [OF. *teil,* the bark of the lime-tree—from L. *tilĭa,* the linden or lime-tree]: the lime-tree or linden, whose inner bark, called bast or bass, is tough and fibrous, and is manufactured into Russian mats; the *Tilĭa Europæa,* ord. *Tilĭācĕæ.*

TEINDS, n. plu. *tēndz* [Icel. *tiund,* the tenth—from *tiu,* ten (see also TEN]: in *Scot.,* tithes, originally payable from the produce of lands and cattle: since the Reformation, that portion of the landed property in every parish which is liable to be assessed for support of the parish minister of the established (Presb.) church (see TITHES: COMMENDATOR). TEIND COURT, court having jurisdiction in all matters relating to teinds, augmentation of clergymen's stipends, erection of new parishes, building of new churches, etc.

TEINE, n. *tēn,* or TEYNE, n. *tān* [Icel. *teinn,* a thin bar: Dan. *teen,* a slender rod]: in *OE.,* an ingot of silver.

TEINOSCOPE, n. *tī'nō-skōp* [Gr. *teinō,* I extend; *skopĕō,* I view]: optical instrument invented by Sir David Brewster and formed of two prisms combined in such a way as to correct the chromatic aberration of the light.

TEJU, or TEGUEXIN: a large lizard (*Tupinambis teguexin*), inhabiting tropical America. The upper parts are deep-black, mottled with green and yellow; the sides show two rows of white spots; and the under parts are yellow, marked with black stripes. A full-grown specimen may be three feet in length, mostly tail. These lizards frequent forests and plantations, are carnivorous,

and their strength and speed enable them to catch a great variety of animals, including barnyard chickens, and eggs. They are consequently hunted, not only as pests, but because they are themselves good to eat. They dwell in burrows, lay hard-shelled eggs in the ground, and defend themselves by vigorous lashing of the tail. Their general resemblance to the Egyptian *Varanus* gives them the burrowed name 'salvator' in some places. This lizard represents an American family, the *Tejidæ*, with long forked tongues largely covered with scale-like papillæ. The teeth are solid and implanted almost on the edge of the jaw, and are therefore intermediate between acrodont and pleurodont. 'This large family,' says Gadow, 'which comprises nearly 40 genera with more than 100 species, exhibits great diversity of form. Some are inhabitants of forests and are arboreal, while others are strictly terrestrial, preferring hot and sandy plains, or they dwell below the surface and are transformed into almost limbless and blindworm-shaped creatures.' Representatives of the family are spread from Texas and Utah to the borders of Patagonia.

TEKELI, *tĕ'kĕly'* (properly TÖKELY, *tö'kĕly'*) EMERIC, Count: Hungarian patriot: 1656-1705; b. at the castle of Kasmark, county of Zips; of noble family. His father, Count Stephen, had been implicated in a conspiracy to free Hungary from the rule of Austria; and young Tekeli sought asylum in Poland, where he had large possessions. Abaffi, Prince of Transylvania, put him at the head of an army of 20,000 men, with which, 1678, he invaded Hungary. His success forced Leopold I. (1681) to temporize, and thus to gain over a portion of the insurgents. But Tekeli, distrusting his sincerity, refused to disarm; and being joined by the Transylvanian prince and the Turks, he was declared by Sultan Mohammed IV. (1682) king of Upper Hungary, and recovered most of the country. Hekeli joined Kara Mustapha in his inroad on Austria; but after the failure of the expedition, the sultan turned against him, and he was imprisoned by the Turks; and during his detention, Hungary was overrun by the Austrians, and Transylvania separated from the Turkish alliance. Tekeli, however, at the head of a Turkish force, burst into Transylvania 1690, and routed the Austrians and natives; but the imperialists so completely defeated his Turks at Zenta (1697, Sep.) that they agreed to the peace of Carlovitz (1697, Nov. 14), by which all aid to the Hungarian malcontents was withdrawn. From this time Tekeli lived in retirement in Turkey: he died at Constantinople.—His wife, HELENA, widow of Ragotsky, was renowned over all Europe for her beauty; and was no less distinguished for heroic bravery, as was proved by her obstinate defense of her castle of Mongatz (Hung. *Munkacs*) against an army of imperialists. Forced to surrender, to save the lives of her children and the prop-

erty of her (Ragotsky's) family, she was afterward exchanged for an Austrian gen. whom Tekeli had captured; and joining her husband at the cost of abandoning her children, shared his vicissitudes until her death, 1703.

TELAMONES, n. plu. *tĕl'ă-mō'nēz* [Gr. *telămōn,* a bearer or supporter]: in *arch.,* figures of men, generally colossal, supporting entablatures: termed also ATLANTES.

TELANGIECTASIS, n. *tĕl-ăn'jĭ-ĕk'tă-sĭs* [Gr. *tēlĕ,* distant, remote; *anggeĭ'ŏn,* a vessel; *ektăsis,* extension]: expansion of the remote vessels; a disease of the capillaries, called 'aneurism by anastomosis,' or 'erectile tumor;' a congenital affection, presenting a cutaneous swelling of a circumscribed form.

TELAUTOGRAPH, n. *tĕl-aw'tō-grăf:* a writing or copying telegraph, invented by Elisha Gray, for producing writing or drawings at a distance by means of a receiving-pen, which, directed by a complex mechanism under the control of electric currents, follows the motions of a transmitting-pen operated at the station of the sender. The current impulses which control the pen at the receiver are regulated by two fine silk cords, which shorten or lengthen according to the motion of the pencil at the transmitting-instrument. The writing or drawing is done at the transmitter on a roll of paper drawn over cylinders, and arranged so that it can be shifted forward as required by means of a small lever. The receiving-pen is a glass tube small enough to draw a writing-fluid by capillary attraction, and is held at the lower end by two aluminum braces, at right angles to the surface of the paper, one of these braces supplying ink to the pen through a rubber tube. The receiving-pen moves simultaneously with the transmitting-pencil, reproducing all its lines, etc., whatever may be written or drawn.

TELEDU, *tĕl'ē-dū* (*Mydaus meliceps*): a quadruped of the Weasel family (*Mustelidæ*), native of the mountains of Java, at an elevation of 7,000 ft. and upward; remarkable, like the Skunk (q.v.), of America, for the excessive fetor of a volatile secretion formed in glands situated a little within the rectum, the emission of which is its principal defense.

TELEGRAM, n. *tĕl'ē-grăm* [Gr. *tēlĕ,* at a distance; *gramma,* that which is written, a letter]: a message or dispatch conveyed by means of electricity sent through a wire; a communication sent by Telegraph (q.v.). To MILK A TELEGRAM, to surreptitiously make use of one in its transmissioin to its owner. *Note.*—This word, coined by a writer in the London *Times,* is open to criticism as formed not according to the law of Greek compounds, which would give instead *telegrapheme.* But its convenient conciseness and long and wide usage have given it standing.

TELEGRAPH, n. *tĕl'ē-grăf* [Gr. *tēlĕ*, far, at a distance; *graphō*, I write]: any contrivance for conveying intelligence to a distance, formerly effected by visible signals (see BEACON; SEMAPHORE; SIGNALS); but now specifically by means of a current of electricity sent through a wire: V. to convey or announce by telegraph. TEL'EGRAPHING, imp. TEL'EGRAPHED, pp. *-grăft*. TEL'EGRAPH'IC, *-grăf'ĭk*, pertaining to or communicated by a telegraph. TEL'EGRAPH'ICALLY, ad. *-lĭ*. TELEGRAPHY, n. *tē-lĕg'ra-fĭ*, the art or practice of communicating intelligence by means of a current of electricity; the science of telegraphs or of the art of constructing them. TELEGRAPHIST, n. *tē-lĕg'ra-fĭst* or *tĕl'ĕ-grăf'ĭst*, one who works a telegraph; one skilled in telegraphy.

TELEGRAPH: the electric telegraph, the earliest useful application of electricity, was first suggested in 1753 by a correspondent to the *Scots Magazine*, who proposed to use a combination of sparks to represent letters. Le Sage of Geneva in 1782 suggested the application of light bodies, for this purpose, and Sommering in 1811 proposed to use an arrangement by which chemical decomposition of water would, by the action of the released gases, lift a series of hammers, and ring cor-

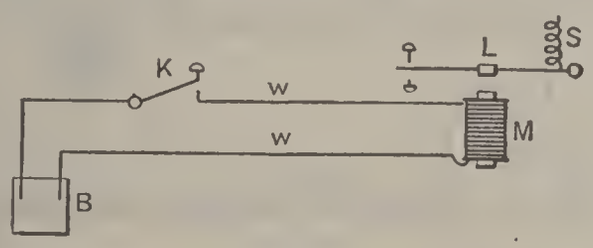


Fig. 1.

responding bells. Ampere in 1820 and Fechner, in 1829, proposed the use of magnetic needles deflected by the passage of current. Baron Schilling in 1832 also devised an electro-magnetic telegraph. The first practical telegraph, however, was that of Gauss and Weber at Göttingen who in 1833 operated through 3,000 feet of wire. In 1837, three independent inventors described practical systems of telegraphy. They were, Von Steinheil of Munich (who had been a pupil of Gauss and Weber), Wheatstone of London, and Morse of the United States. It is needless here to describe the various systems as first devised, and the many changes the present system has passed through to reach its condition of existing perfection.

Simple Telegraph.—In Fig. 1 is shown a diagram of a simple telegraph circuit. It consists of a battery, B, and an apparatus for opening and closing the circuit, called a key, K, at the sending end of the line, two wires, W W connecting the sending and receiving stations, and the receiving apparatus. The latter is simply an electromagnet, M, and a small bit of soft iron mounted on a lever, L, which is free to move between two stops. A spring, S, holds the lever away from the electromagnet.

If, now, the key is pressed down so as to close the cir-

cuit, the current will flow, the electromagnet will attract the bit of iron and the lever will be pulled down toward the electromagnet so that its end will strike one of the stops and produce an audible click. When the key is released and the circuit broken, the electromagnet ceases to attract the iron and the spring pulls the lever back into its original position, making what telegraph operators call the 'return click.' These clicks, with the longer or shorter intervals between them, form a code of signals representing letters and figures which the operators interpret into words and messages.

In practice it has been found that the earth itself is a fair conductor. Consequently the arrangement shown in Fig. 2 is used. One of the two wires shown in Fig. 2 is suppressed, plates buried in the earth or water or gas pipes being used to secure a good electrical connection with the ground at each station.

The earth may be supposed to act as a conductor between the two places, or simply as a vast reservoir of electricity, from which the battery pumps out a little at one station, sends it over the line and restores it at the

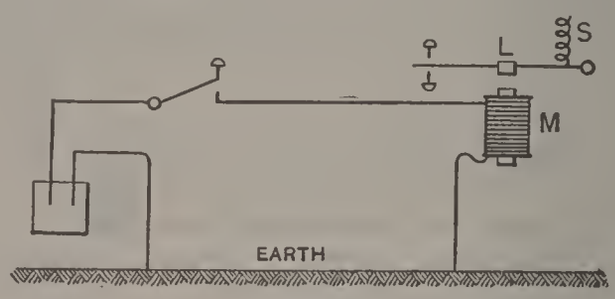


Fig. 2.

other. Perhaps the latter explanation is more nearly a true statement of the facts of the case.

On long telegraph lines the resistance of the wire employed is considerable and the amount of current (amperes) that the battery can pump through is insufficient to cause a loud click at the receiver. An instrument known as a relay is employed to re-enforce the energy of the clicks. It consists of an apparatus exactly similar to the ordinary receiver illustrated in Figs. 1 and 2, but made with a very delicately adjusted lever. The stop for the lever is made like the sending key, and the movements of the lever are used to make and break the circuit of another battery at the receiving station, called the 'local battery.' In this local circuit is placed the magnet of a loud-clicking receiver or 'sounder'. The arrangement is shown in Fig. 3. It will be noticed that several cells or jars of battery are shown at the sending station in this illustration. This arrangement is used where the electrical pressure or voltage from one cell is insufficient to cause enough flow of current for the purpose in hand through the necessary resistance of the circuit. In former days, collections of great numbers of cells of batteries were located in some telegraph offices, as many as 500 cells being used sometimes to work lines several hundred miles

in length. Today, the current used in telegraphy is generally generated by dynamo machines.

The sending and receiving instruments are duplicated at the two ends of a line, and at any intermediate station it may pass through, so that any station may send or receive. The usual speed of hand telegraphy (in which the sending key is worked by the operator's hand) is about 30 words a minute. By punching a ribbon of

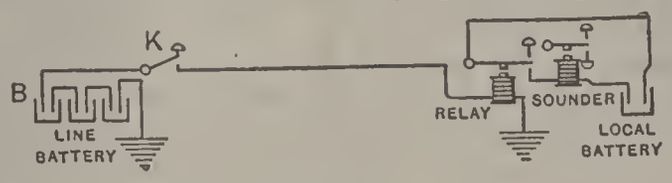


Fig. 3.

paper with holes corresponding to the long and short signals of manual telegraphy the contact closing and opening key of a special sending machine can be worked at enormous speeds. The resulting clicks are then too rapid to be intelligible to the ear, so the lever of the receiving instrument is made to register its movements on another paper ribbon. By this system several operators at each terminal can be busied with punching sending tapes or translating the received ones, while a great volume of business can be conducted over a single wire.

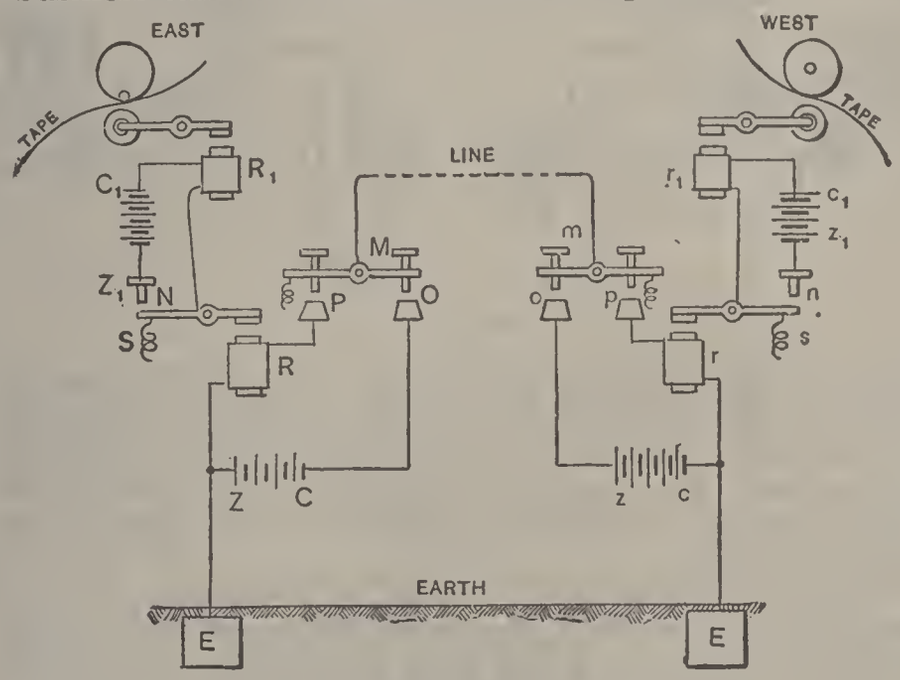


Fig. 4.

The figures shown are diagrammatic only and simply meant to indicate the principle of operation. Fig. 4 gives the actual connections showing both ends of the line. At either end messages may be received or sent. M and *m* indicate the Morse signalling keys, O *o* sending contacts, P *p* receiving contacts, R *r* the magnets of the relays, N *n* contact levers of the relays, R_1 r_1 the electro-magnets of the receiving apparatus, C Z and *c z* sending batteries, C_1 Z_1 and c_1 z_1 local batteries of both stations; S and *s*

are two springs which pull off the armatures of the relays R r and open the contacts N n as soon as current ceases in the line circuit. When no signalling is going on, the stations are connected by means of the line L and earth E E, the keys having their contacts P and p closed. When one station wishes to send a telegram to another, the following circuit can be closed by pressing down the key M upon O, so as to close the contact at O, and at the same time to open the contact at P. From the pole C of the sending battery, the current flows over O M through the line into the second station, thence it proceeds over m p into the electro-magnet r of the relay, and so to earth. The other battery-pole Z of the sending station is also connected with earth. The electro-magnet r attracts its armature, contact is made at n, and the local circuit of the receiving station closed. A current entirely distinct from that received from the distant station now flows from one pole c_1 of the local battery into the electro-mag-

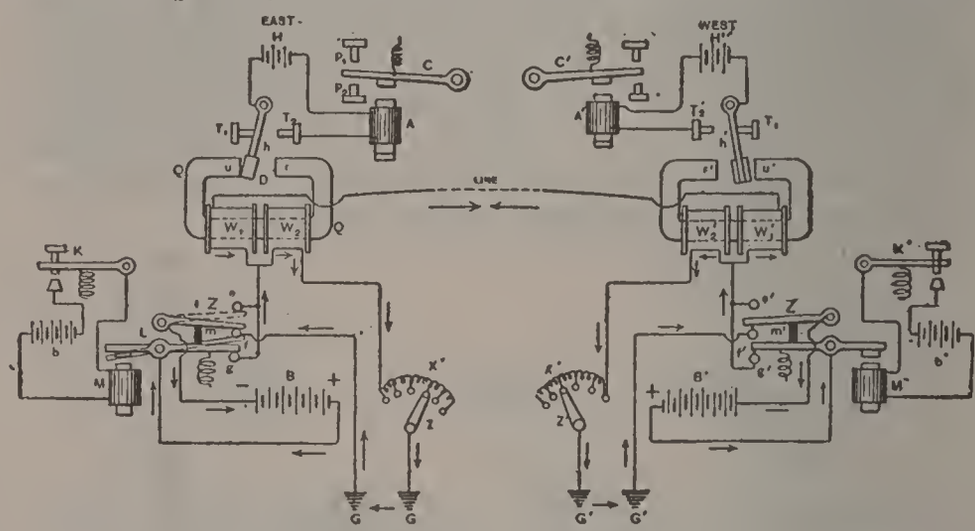


Fig. 5.

net r_1 of the receiving instrument through the line I_1, over n, hence back to the second pole z_1 of the local battery. The magnet of the receiving instrument attracts its armature, presses the pencil or printing wheel against the strip of paper or tape, and reproduces the signal given by the key M.

Duplex Telegraphy.—In order to transmit messages simultaneously in both directions and avoid the duplication of transmission wires, with their attendant increase in cost maintenance, complication and the possibility of interruption, the duplex system was devised. Its essential parts and the principles involved are very simple and depend on the following laws:

1. Current from the same source will divide into two equal parts if two circuits of equal resistance be connected to the source.

2. If a magnetized piece of steel be placed near the poles of a magnet the N pole of the magnetized piece will be attracted by the S pole of the magnet.

3. A current passing through a coil in one direction

magnetizes a bar of iron to form N and S poles at the ends of the bar, and if the direction of current flow through the coil be reserved, the N and S poles will reverse to opposite ends of the bar.

Fig. 5 shows diagrammatically the operation of this system. The apparatus at the two stations being identical, it is only necessary to describe one.

K is the operating key which when depressed closes the circuit through magnet M from battery *b* and causes the lever L to move.

B is the main battery, W_1 and W_2 magnetizing coils on the iron bar Q which is bent over until its ends are only a short distance apart as shown. Between the ends swings a lever h having a piece of magnetized steel on its lower end, in the gap between the ends of the iron bar Q. This lever oscillates about its pivot, between the screw stops T_1 T_2. Coil W_1 has one end of its winding connected to the line, the other end being connected to the two points *e* and *g* of the 'pole changer' switch. Coil W_2 has one end also connected to *e* and *g*, its other end passing through resistance *x* to the ground. The resistance is adjusted to give a resistance exactly equal to that of the line and is called the 'artificial line.'

The point *f* of the 'pole changer' switch, is connected to the ground G. The lever C oscillating on its pivot, between the screw stops p_1 p_2 forms the sounder.

When neither key is depressed, no current flows through the circuit of batteries B B_1 nor H H_1. Current however flows from the positive pole of battery B through lever L to point *g* thence to coil W_1, through resistance X and the ground connection back to the negative pole of the battery, through point *f* and auxiliary lever Z. This local circuit is indicated by the small arrows.

Current also attempts to flow through coil W, over the line, but meets the opposing current of the battery B_1 at the other end of the line as indicated by the two arrows → ← The opposing batteries being equal in strength, no current flows over the line and coil W_1 produces no magnetizing effect on bar Q.

Coil W_2 however is magnetized and produces magnetic poles at *u* and *r*. If *u* be a south and *r* a north pole, and the piece at the lower end of *h* be a north pole, the latter will be attracted to *U* and *h* will rest against stop T_1.

If K be depressed and the circuit through magnet M from battery *b* be closed, lever L will move, moving with it lever Z which is connected to L by insulating piece *m*. Lever L now contacts with point *f* and Z touches point *e*, thus connecting the *negative* pole of the battery B to the line. This reversal of polarity makes the batteries B and B^1 work together to send current over the line instead of opposing each other. The added effects of B and B^1, are double that of either battery alone and therefore twice as much current flows through the line as now flows through the artificial line of equal resistance. The direction of current flow through the artificial line and the

coil W_2 is reversed and the magnetism at the poles *u* and *p* would be likewise reversed if it were not for the line current through coil W_1. This latter current is passing in such a direction as to maintain the magnetization of the poles *u* and *p*, the same as they were before the key was depressed and as its magnetizing effect is double that of the coil W_2 the resultant magnetization is the difference between the two, which gives the pole strengths and polarities of *u* and *p*, the same as before the key was depressed. Therefore the piece *h* remains in its position as shown.

At the other end of the line however, coil W'_2 retains its magnetizing effect the same in magnitude and direction as before the depressing of key K. The line current however, now passing through coil W'_1 is in a direction opposite to that of coil W'_2 and being twice as great as the current through W'_2, the net magnetization is equal to the difference between the two and in a direction reverse to that existing before the depression of key K. Lever h^1 therefore, swings over to strike against stop T'_2. This closes the circuit of battery H^1 through magnet A^1 and draws down the lever C′ of the sounder against stop P'_2. Thus it is obvious that the depression of a key operates the receiving apparatus of the distant station, but does not effect that at the station from which the message is sent.

The Morse Alphabet.—This alphabet is universally recognized as a master-piece of cryptography. There are two codes, the American and Continental (European); the latter is also the English code.

The following is the American Morse code:

A- —	J— - — -	S- - -
B — - - -	K— - —	T—
C- - -	L——	U- - —
D— - -	M— —	V- - - —
E-	N— -	W - — —
F- — -	O- -	X- — - -
G— — -	P- - - - -	Y- - - -
H- - - -	Q- - — -	Z- - - -
I- -	R- - -	&- - - -
1- — — -	6- - - - - -	Period- - — — - -
2- - — - -	7— — - -	Comma - — - —
3- - - — -	8— - - - -	Interrogation— - - — -
4- - - - —	9— - - —	Exclamation— — — —
5— — —	0———	

The signals, as given below, are those of the Continental system and are arranged in the groups, and accompanied by the mnemonic phrases, adopted by the British post-office when, in 1870, the transfer of the telegraphs to the government rendered necessary the rapid training of thousands of telegraphists throughout the kingdom:

Group 1.		Group 2.	
-	E, Earwigs	—	T, Turnips
- -	I, infest	— —	M, make
- - -	S, summer	— — —	O, oxen
- - - -	H, houses.	— — — —	C, cheerful.

Group 3.		Group 4.	
- —	A, A	— -	N, No
- — —	W, wet	— - -	D, difficulty
- — — —	J, jacket's	— - - -	B, baffles
- - —	U, uncomfortable	— — -	G, great
- - - —	V, very.	— — - -	Z, zeal.

Group 5.		Group 6.	
- — -	R, Remember	— - —	K, Kindness
- — - -	L, law	— - — -	C, conciliates
- — — -	P, preserves	— - — —	Y, youth
- - — -	F, freedom.	— - - —	X, extremely
		— — - —	Q, quickly.

The arrangement for the numerals is next given. Each figure is represented by five signals thus:

1, - — — — —	6, — - - - -
2, - - — — —	7, — — - - -
3, - - - — —	8, — — — - -
4, - - - - —	9, — — — — -
5, - - - - -	0, — — — — —

These are the numerals printed long, but on busy circuits expert clerks adopt the practice of 'sending short,' omitting all after the first dash in 1, 2, and 3, four of the dots in 5, and all before the last dash in 7, 8, 9, and 0. It is stated that Prof. Morse founded his alphabet upon information given him by his brother, a journalist (see MORSE, SIDNEY E.), as to the numerical relation of the letters in the Eng. alphabet, the simplest signal (a dot) being given to E, and the next simplest (a dash) to T, those letters occurring most frequently.

Telautograph.—A writing or copying telegraph, invented by Elisha Gray, for producing writing or drawings at a distance by means of a receiving-pen, which, directed by a complex mechanism under the control of electric currents, follows the motions of a transmitting-pen operated at the station of the sender. The current-impulses which control the pen at the receiver are regulated by two fine silk cords, which shorten or lengthen according to the motion of the pencil at the transmitting-intrument. The writing or drawing is done at the transmitter on a roll of paper drawn over cylinders, and arranged so that it can be shifted forward as required by means of a small lever. The receiving-pen is a glass tube small enough to draw a writing-fluid by capillary attraction, and is held at the lower end by two aluminum braces, at right angles to the surface of the paper, one of these braces supplying ink to the pen through a rubber tube. The receiving-pen moves simultaneously with the transmitting-pencil, reproducing all its lines, etc., whatever may be written or drawn. In furnishing the current an ordinary telegraphic battery may be used.

See also TELEPHONE; ELECTRIC COMMUNICATION, SYSTEMS OF; WIRELESS TELEGRAPHY; TELAUTOGRAPH; TELEGRAPHY, SUBMARINE; LOCOPHONE, etc.

TELEGRAPHONE: An electro-magnetic phonograph. Its operation is based on the variation in current flow over a circuit connected to a telephone transmitter when the transmitter is spoken into (see TELEPHONE). The circuit from the transmitter passes through coils which energize a small electro magnet having its poles very close together. A fine steel wire is moved along between the magnet poles by means of a small revolving drum. When the receiver is spoken into, the varying currents thus produced, set up a correspondingly variable magnetization of the electro magnet and the moving wire is variably magnetized along its length as it passes between the magnet poles.

On connecting the magnet coils to a telephone receiver and again passing the wire between the magnet poles, the different strengths of magnetization along its length will induce varying currents in the magnet coils, which, in turn will cause motion of the telephone receiver, and thus reproduce the sound wave that originally caused the magnetization of the recording wire. (See TELEPHONE.) The records are practically permanent but may be instantly removed by passing the wire between the poles of a strong magnet, having a steady strength which is a part of the apparatus. This effectually obliterates the record and leaves the wire ready to receive a new record.

TELEGRAPHY, SUBMARINE SOUND: a system of communication between steamships at sea by sound telegraphy through water, an invention next in importance to wireless electric telegraphy through the atmosphere. In 1901 A. J. Mundy tested an experimental boat in Boston Harbor, based on experiments in the conductivity of sound through liquids by Prof. Elisha Gray. More recent experiments by J. B. Millet have proved remarkably successful. Signals have been exchanged between a lightship bell and a ship 7 miles distant at sea.

It is a well-known fact that sound travels faster through water or liquids than air, and this is taken advantage of in a novel and practical way. In the ship at sea are two sound receivers, one upon each side in the hold, located approximately 20 feet below the surface of the water. The lightship has the sounding bell hung through a well in the centre of the ship, about 25 feet below the bottom. It also has a receiving apparatus. Near the lighthouse on shore is a buoy from which depends a bell, with a pipe leading to the shore to a compressed-air reservoir in the lighthouse. The bell is suspended by a main chain, while a second operating chain is attached at its lower end to the bell crank of the hammer, and the upper end to a pneumatic piston, which is operated by compressed air either from the anchored lightship or the lighthouse, as the case may be, or it may be operated by a direct upward pull by manual power if desired. It has been ascertained that the receiver for collecting the sound vibrations need not be located on the

outside of the vessel, but operates as well when clamped on the inside against the inner surface of the outer hull, especially in iron ships. The sound vibration from the bell passing through the water is communicated to the side of the ship's hull, and that in turn to the liquid or water in the receiver. This consists of a cup-shaped metal cylinder having the open end edged with rubber, and clamped against the side of the hull. Four hook-supporting arms project inward from the hull, and upon these rest two crossbars in which are hook eyebolts, the hook portion being clamped over projections on the surface of the receiver. By this arrangement the open end of the receiver is clamped securely against the side of the ship's hull, making a water-tight joint.

Inserted in the top of the receiver is an electric transmitter, something on the order of a telephone transmitter, from which wires are run to the pilot house of the ship. The wires are connected to a battery and the primary coil of an induction coil in the usual way, and the telephone receivers to the secondary coil. It is obvious that when a sound impulse is given to the liquid in the receiver in the hold of the ship, it will be transmitted electrically to the telephone receiver in the pilot house. As the sound travels through the water in every direction from its source, it is found that the impulse will be stronger and louder on the side of the ship nearest to the source. By this means the direction of the sounding bell is ascertained, for by listening to the telephone receiver attached to the starboard side water receiver, and then switching over to the port side and listening to that telephone receiver, the ear detects at once which is the louder sound of the two. This was determined experimentally by turning the ship around in a large circle, when the difference in the sound from one side to the other was very noticeable, according to which side was nearer or farther away from the sounding bell. In a portable apparatus of this kind for small fishing boats the bell is suspended over the side of the boat, the hammer being operated by a separate rope. In the box is a coil or electric cable attached to a hollow water-tight spherical globe containing the electrical transmitter. This is lowered overboard with the bell, and enables two boats so equipped to signal to each other. The sound is conveyed from the spherical transmitter bulb while immersed in the water to the telephone receivers in the same manner as previously described. A depth of 25 feet is said to give the best results. In foggy weather, signals of this kind are readily heard, regardless of which way the wind is blowing. It is feasible to signal words with a special code, and no doubt such a system of communication will be perfected. The usefulness of the system in safeguarding ships against collisions at sea at night or in a fog is evident.

TELEGRAPHY, SYNCHRONOUS, *sĭn'krō-nŭs tē-lĕg'-*

ra-fĭ: a system of multiplex telegraphy (see TELEGRAPH), of which the following gives the outline. Two wheels at the opposite ends of the main line are kept in absolutely synchronous rotation electrically. Each wheel carries a rotating arm or trailing contact, which at each rotation of the wheel comes in connection with a series of stationary contact pieces, alternately grounded and insulated, and distributed symmetrically around both wheels: a grounded contact at one end corresponds with an insulated contact at the other. Telegraph instruments are connected to the different contacts, and the wheels in operation rotate so rapidly that each pair of instruments works independently of all the others, utilizing the line only in the little fractions of seconds afforded by the arm as it rotates, but which fractions succeed each other so rapidly as to act like a regular connection. Thus each instrument has the line entirely to itself during these intervals; but as many as 72 separate printing circuits have been maintained by one main line.

TELEG'RAPHY, TRAIN: system for transmitting messages telegraphically from a moving train to a telegraph line by the side of the track, without any contact: see LOCOPHONE. The static system of W. W. Smith and Thos. A. Edison operated by charging and discharging the roof of the car, and thus affecting the line. The operations of charging and discharging followed each other with extreme rapidity, and were split up into 'dots and dashes.' A telephone receiver took the place of a sounder. The dynamic system of Willoughby Smith and Lucius J. Phelps provided the car with a coil of insulated wire, which was in circuit with a key and battery. By electro-magnetic induction, Morse signals were sent and received. An induction coil was generally recommended, and the metallic car-roof and tie-rods under the car were used as elements of the coil. Train telegraphy is not now employed, not having proved of sufficient practical value.

TELEGRAPHY, WIRELESS: See WIRELESS TELEGRAPHY.

TELEMACHUS, *tē-lĕm'a-kŭs:* in ancient legend, son of Odysseus (see ULYSSES) and Penelope. He was an infant when his father left home to join in the war against Troy, but during the latter's absence of about 20 years grew into manhood. At the instigation and under the guidance of Athene (Minerva), who had assumed the appearance of Mentēs (commonly known as Mentor, L., 'the thoughtful one') King of the Taphians, his father's dearest friend, Telemachus set out in search of his long-lost sire, after having vainly endeavored to eject his mother's troublesome suitors from the house. Having visited Pylos and Sparta, where he was hospitably entertained, Telemachus returned home to Ithaca, where he found his father in the guise of a beggar, living with the

swine-herd Eumæus. After mutual recognition, father and son proceeded to slay the suitors.—In modern times, Telemachus is known chiefly as the hero of Fénelon's romance, *Télémaque,* once very popular as a school-book (see FÉNELON).

TELEMETER, *tē-lĕm'ē-tėr* [Gr. *tēle* and *metron,* measure]: instrument for measuring distances in surveying, in artillery practice, etc., also, apparatus for electrically indicating and recording at a distance the indications of instruments such as the barometer, wind-gauge, etc. TELEM'ETRY, measurement of distances; art of employing the electric telemeter.

TELEMICROPHONE, n. *tĕl-ē-mī'kro-fōn* [from *telephone* and *microphone*]: combined apparatus simultaneously producing the effects of the microphone and the telephone, and reversible like the latter.

TELENGISCOPE, n. *tē-lĕn'jĭ-skōp* [Gr. *tēlĕ,* afar off; *enggus,* near; *skopeō,* I see]: instrument combining the powers of the telescope and microscope.

TELEOLOGY, n. *tĕl'ē-ŏl'ŏ-jĭ* [Gr. *telos,* an end; *logos,* a word]: the doctrine of final ends or causes. TEL'EOL'OGIST, n. *-jĭst,* one who seeks for or studies the final causes of phenomena. TELEOLOGICAL, a. *tĕl'ē-ō-lŏj'ĭ-kăl,* relating to or connected with final causes. TEL'EOLOG'ICALLY, ad. *-lĭ.*—*Teleology* is a doctrine brought into philosophic discussion by Aristotle. The idea of a final cause or end entered into the Aristotellan conception of physical science; but it enters more properly into ethical science or morality (see END, in Ethics; ETHICS). All the ancient systems of morality, from Socrates downward, correctly regarded teleology as a *practical* science; they started with the inquiry, 'What is the proper and final end of all human conduct?' and the answer given by each school was the characteristic doctrine of the school. Aristotle answered, 'Happiness, in a peculiar sense;' the Stoics said, 'A regard to the whole universe of being;' the Epicureans, 'Pleasure and the absence of pain.' John Stuart Mill, in the concluding chapter of his *Logic,* entitled, 'The Logic of Practice, or Art; including Morality and Polity,' adopts the ancient (ethical) point of view, and observes that there should be a science of ends, or a reasoned statement of the final purpose of all human action; for this science he suggested the name 'teleology,' remarking that it corresponds to what the Germans call the practical reason. There would be comprehended under it the art of living or happiness, taste or the beautiful, morality, and politics. See CIVILIZATION.—In philosophical theology as distinguished from ethics, teleology, in the sense of the science of adaptation to a purpose, is applied to the argument from design in proof of the existence of God—the evidence of design in the universe being held to show a designer—i.e., to point to God as the ultimate cause of all things (see under the

title God). For a discussion of this subject under recent aspects, see Paul Janet's *Final Causes.* This is in keeping with Aristotle's use of the word in physics. The Kantian and Hegelian philosophers hold that the universe of reality is essentially rational, and, therefore, as embodying the progressive realization of ends, teleological.

TELEOSAURUS, *tĕl-ē-ō-saw'rŭs:* genus of fossil crocodiles, whose remains occur in the Oolitic rocks. They are found associated with marine fossils, and the peculiar modification of their skeleton seems to have fitted them specially for an aquatic life. Both surfaces of the vertebræ were slightly concave, the hind legs were large and strong, and the anterior portion of the body gradually tapered into the long and slender jaws, giving the animal the aspect of the gavial of the Ganges, only the jaws were more attenuated, and the nasal aperture, instead of being oblique, opened vertically on the truncated end of the upper mandible. The jaws were armed with numerous equal and slender teeth, slightly recurved, and admirably adapted for capture of fishes.

TELEOSTEI, n. plu. *tĕl'ē-ŏs'tē-ī,* or *tē'lē-* [Gr. *telĕŏs, telei'ŏs,* perfect; *ŏstĕon,* bone]: an order of fishes having a complete bony system; typical fishes, forming the third and highest sub-class, as separate from Sharks and Ganoids (q.v.). The skeleton is bony, not cartilaginous; the skull of numerous parts, though mostly fused together; the gills usually in four pairs, with several opercular bones. There are 8 orders: Opisthomi, Apodes, Nematognathi, Scyphophori, Teleocephali (including the common and edible fishes), Pediculati, Lophobranchii, and Plectognathi (qv.). See Fishes; Cartilaginous Fishes; Ichthyology; Vertebrata; Zoology.

TELEPATHY, n. *tē-lĕp'a-thĭ* [Gr. *tēle,* afar; *pathein,* to feel, to suffer: transference of thought without any known means of physical communication. A large body of evidence bearing upon the question of telephathy has been collected by the Society for Psychical Research and published in its proceedings. Besides the attempts to investigate the phenomena experimentally (see Mind Reading), volumes have been filled with reports of dreams, hallucinations, apparitions, clairvoyance, crystal visions, spirit communications, etc., in which an appearance has coincided with some distant event. These communications seem to be simply explained by supposing the power of telepathy exists under favorable conditions or with certain supersensitive individuals. This evidence has been sympathetically examined by F. W. H. Myers in his work on *Human Personality and Its Survival After Death,* and critically studied by Frank Podmore in his *Studies in Psychical Research* and in *Modern Spiritualism,* as well as by Edmund Parish, who especially criticised the deductions from the census of hallucinations collected by the Psychical Research Society. Pod-

more and Myers, together with E. Gurney, have also compiled a large mass of the evidence in two volumes on *Phantasms of the Living.*

The most frequent coincidences of thought and distant event are dreams or hallucinations at the time of the death of a relative or a friend. Whether these veridical, or truth-telling, thoughts are anything more than chance occurrences, depends upon how many such thoughts have occurred that were not true. These are usually forgotten at once, so that no record of these can be obtained. The instances where some important crisis in the life of a friend has been apparently felt by one who is close to him in interest, but absent from him in body, are so numerous that there is a wide popular belief in some forms of telepathy. The evidence is so abundant that it demands recognition and explanation rather than mere scornful skepticism. After the credibility of the records has been carefully inquired into, and all allowances made for misrepresentation of the resemblances, and for the tendency of two persons to think similarly, another hypothesis that explains part of the seemingly telephatic messages is, that they are illusions of memory. The recipient, after knowledge of the event has been received, is confident that he knew of it before. His fancy supplies all the details of the communication, which is then, as a dream or hallucination, dated back to the time of the event. On account of this fallacious dating of memory images, it is essential that full accounts of communications should be recorded before any knowledge or suggestion of the event is possible.

Prominent scientists who have carefully investigated the matter, with a few exceptions, believe that telepathy has not as yet been proven. It is generally admitted, however, that the hypothesis is to be preferred to that of spirit communications for explaining the messages received in the trance state by Mrs. Piper, Mrs. Thompson, and other non-professional mediums who have been studied under the direction of the Society for Psychical Research. Sir William Crookes and others have suggested that communications from mind to mind might be understood by some subtle form of ether motion which has not otherwise been detected. There is little evidence for such a theory. If the agents for these transmissions have a special telepathic sense, Podmore has suggested that it might better be regarded as a reversion to a lost sense than as the acquisition of a new form of sensitivity. Communication by speech and writing offers such decided advantages in the struggle for existence, that vague telepathic impressions would have soon dropped out from disuse, or would have been lost by the survival of those individuals who used more definite methods of communication. See MUSCLE READING.

TELEPHONE, n. *tĕl'ĕ-fōn* [Gr. *tēlĕ*, afar off; *phōnē*, a sound]: instrument by which articulate speech or musi-

cal sounds can be transmitted instantaneously, and with distinctness, to almost any distance, by means of currents of electricity: V. to transmit speech by the telephone. TELEPHONIC, a. *tĕl'ĕ-fŏn'ĭk,* conveying or sending sound to a great distance; transmitted by telephone. TELEPHONY, n. *tĕl-ĕf'ŏ-nĭ,* the art of transmitting sounds by telephone. TELEPH'ONIST, n. *-ŏ-nĭst,* one versed in telephony. —The *Telephone* is a recent development of a principle in the transmission of sound. In 1837 Dr. C. G. Page, of Salem, Mass., made an important discovery as to the sound from an electro-magnet coincident with closing or breaking the electric current, and discussed (see *Silliman's Journal,* XXXII., XXXIII.) the musical note produced by rapid revolution of the armature of an electro-magnet in front of the poles. In 1854 Charles Bourseul published in Paris an article on the electric transmission of speech. In 1860 Reis of Frankfort first applied the principle of the telephone, using a membrane which, vibrating under the action of sound, caused pulsations of electricity to pass along the wire, and actuated the armature of an electro-magnet, which, mounted on a sounding-board, reproduced a sound corresponding in pitch and rhythm with the original: the quality of the sound, however, was entirely lost.

The original telephone was made by Reis in 1860. It would convey musical notes over distances, but not articulate speech. Later workers in the field were S. Yeates (1865), Wright (1865), Elisha Gray (1874), C. and L. Wray (1876), C. Varley (1877), also Van Der Weyde, Pollard, and Garner. Prof. Graham Bell, however, first produced a satisfactory instrument, although Berliner in 1877 devised a transmitter which proved a successful device.

The telephone depends for its operations upon the accurate reproduction in the receiving instrument of the vibrations into which the sound of the voice at the transmitting end throws a part of the transmitting apparatus.

The simplest form of a telephone circuit, consisting of two ordinary receivers connected together, is shown in Fig. 1. Each receiver consists of only four essential

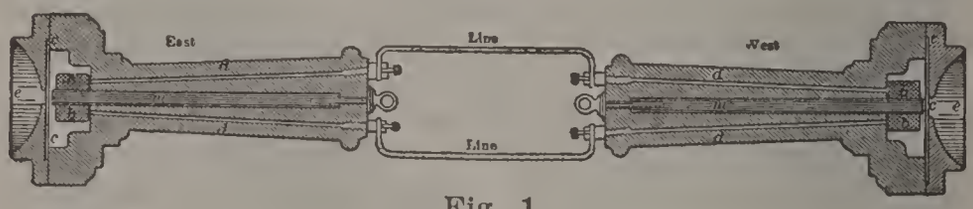


Fig. 1.

parts; a steel bar *m* highly magnetized, a coil of fine insulated wire *b* wound upon one end of it, a thin circular sheet or diaphragm *c* of varnished iron, and a conveniently shaped case for containing all these parts. The ends of coil *b* are connected by wires *d d* to the binding posts *v v* on the opposite end of the case. The instruments may serve as transmitters, also, the only essentials

necessary for a telephone conversation being two of them, and the circuit of wires connecting them. As in telegraphy, the earth may be used for part of the circuit, requiring only one wire between the terminal stations. Grounded telephone lines do not work well, however, in these days, when many circuits carrying large currents for trolley roads and the like are also 'grounded' (using the earth as part of their circuits), as the telephone is almost incredibly sensitive to stray currents and external electrical disturbances. When one speaks, his vocal cords set the air issuing from his lungs into vibration, and these vibrations are modified, strengthened here and suppressed there, by the action of the cavities of the mouth and nose, or the position of the tongue and lips. The vibrations producing the sounds of articulate speech are exceedingly complex and range from 200 to about 4,000 to-and-fro swings of the air particles disturbed by them in each second. If the left-hand instrument in Fig. 1, for example, is spoken into, the air in the small opening *e* in front of the diaphragm *c* is thrown into vibration, and the diaphragm itself is caused to vibrate similarly, its central part advancing and receding perhaps a thousandth of an inch. Just behind and very close to this central part is one end, or pole, of the magnetized steel bar *m*. The lines of force emanating from this go almost straight across the small air gap between it and the diaphragm and stream out from parts of the surface and edges of the latter to find their way back to the other end of the magnet. In so doing they pass through the coil *b*.

Now, the total magnetic flux, or number of lines of magnetic force, streaming from the magnet through the diaphragm and back, is dependent upon what may be called the magnetic resistance of the gap between the diaphragm and the magnet pole, and thus resistance varies with the distance apart of diaphragm and pole. The vibrations of the former alter this distance. If the diaphragm approaches the magnet, the resistance of the air space to the magnetic flow is decreased and more magnetic lines spring out. This change in the number of magnetic lines passing through a closed coil of wire produces a current in the coil in accordance with well-known electrical laws. If the diaphragm recedes, the air gap is increased, the number of magnetic lines decreased, and again a current is set up in the coil *b*, but in the opposite direction. In this way every movement of the diaphragm, accurately following the original sound vibrations, is faithfully reflected by an alternation of current in the circuit connected with the coil *b*. The sound waves have been transformed into alternating electrical current, similar in character to the sound waves.

This alternating current, moving around the circuit, passes through the coil of the receiving instrument. Since this coil surrounds the bar *m* of the receiving instrument, any current passing through the coil has a mag-

netizing effect on the bar. As it is, however, already magnetized, current flowing through the coil in one direction will strengthen, while current flowing in the opposite direction will weaken its magnetism, and, the alternating current circulating in its coil acts simply to strengthen or weaken the magnetism of the bar, according to which way the current is flowing in the coil, thus causing the magnetic pull of the bar on the iron diaphragm to vary in precise accordance with the alternations of the current. In other words, the pull on the diaphragm follows every vibration of the original sound wave, and the diaphragm itself, being elastic, is moved back and forth, causing the air in front of it to vibrate just as does that in front of the diaphragm at the transmitting end. The ear placed close to the receiver perceives these minute air pulsations as a faithful reproduction of the original sound. In this way, by mechanism whose perfection is as remarkable as its simplicity, conversation may be carried on over moderate distances.

The magneto telephone, such as has just been described, is now used only as a receiver and is no longer used as a transmitter, more satisfactory and powerful transmitting instruments having been produced.

A great improvement in the art of telephony resulted from the invention of the battery transmitter. While conversation could be carried on over lines of considerable length by the apparatus described above, consisting essentially of two ordinary receivers, one of which is used as a transmitter, still the energy of the electrical impulses produced by such a transmitter is so small that on long lines, owing to resistance and leakage and other specific qualities of the line, sufficient energy was not received to make conversation easy

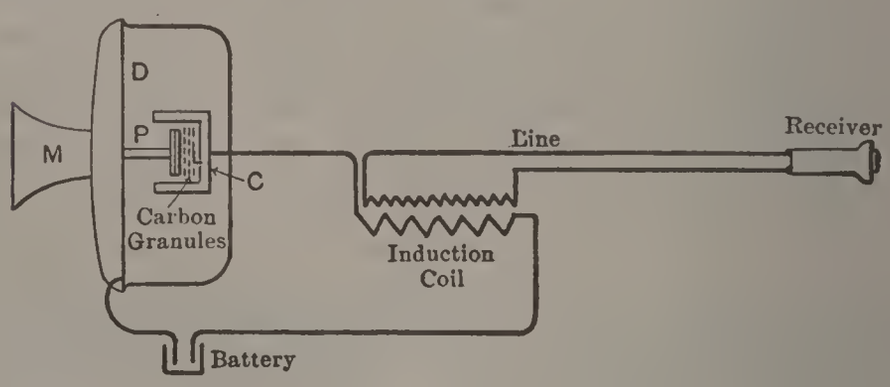


Fig. 2.

In Fig. 2 are illustrated in diagram the essential principles of the battery transmitter in general use. The principle of its operation depends upon a phenomenon discovered by Hughes and Edison, which is that the resistance of a mass of small particles of broken carbon to the passage of electric current varies directly according to the amount of pressure exerted upon it. If such

FRONT VIEW OF AN AUTOMATIC TELEPHONE SWITCH.

particles are compressed, their resistance becomes very much less than when they are simply allowed to rest together by their own weight.

The battery transmitter, in brief, consists of a cup *C* filled with granular particles of hard carbon about the fineness of ordinary building sand. Into this cup projects a plunger *P*, attached to the middle of a diaphragm *D*, in front of which is an air chamber connected with the mouthpiece and so arranged that conversation in front of the mouthpiece sets the air in it, and hence the diaphragm, into vibration. This vibratory motion of the diaphragm causes the plunger *P* to move in and out in the cylindrical cup, alternately compressing and releasing the carbon particles. An electrical connection is made from a battery through the diaphragm, the plunger and the small particles of carbon to the back of the cup, and thus through the primary or coarse winding of the small induction coil. This coil usually consists of a core of fine iron wires, about three inches long, upon which is wrapped one or two layers of copper wire of a size comparable with coarse sewing thread. Over this are wound several thousand turns of this fine, hair-like copper wire. The terminals or ends of this fine, outside wire coil are connected with the line, at the distant end of which is a receiver. When this apparatus is talked into, the vibratory compression of the carbon particles causes their resistance to vary in direct proportion to the pressure upon them. This variation in resistance, which follows exactly the sound waves impinging on diaphragm *D*, produces a corresponding vibration in the current flowing through the battery circuit and the coarse wire or primary winding of the induction coil.

These electrical fluctuations would themselves actuate a telephone receiver and be intelligible as speech, but the available pressure which may be had from one or two cells of battery is not sufficient to cause currents of working volumes to flow through long lines. In order to obviate the necessity for having a battery of very large size—that is, of many cells—for each telephone, the induction coil is used to repeat into the circuit of the line a current at a much higher pressure, or voltage, but in all respects similar to that impressed upon the primary coil or winding. The current in the line is produced by induction between the two windings of the induction coil in the manner described in ELECTRICITY, PRINCIPLES OF, and since the number of turns on the coil connected to the line are greater than the number connected to the transmitter, the current changes in the transmitter are greatly magnified. This current flowing out through the line is transformed by the receiver into mechanical motions of its diaphragms, and these in turn impress themselves upon the contained air in the receiver chamber as audible waves of sound, reproducing the speech spoken into the mouthpiece of the transmitter as has been explained.

TELEPHONE.

The apparatus described above constitutes all that is essential to telephonic conversation. All of the other parts of telephone systems may be grouped under the heading of telephone accessories, since they are used simply in signaling that conversation is to begin or is at an end, or for connecting together telephone lines, as may be desired. They play no part in the transmission of conversation.

Taking the simplest case first, that of a line having one set of telephone instruments at each end, the accessories consist of call bells and switches, whereby, when the telephones are not in use, the connections with the battery are cut off so as to avoid the waste of battery

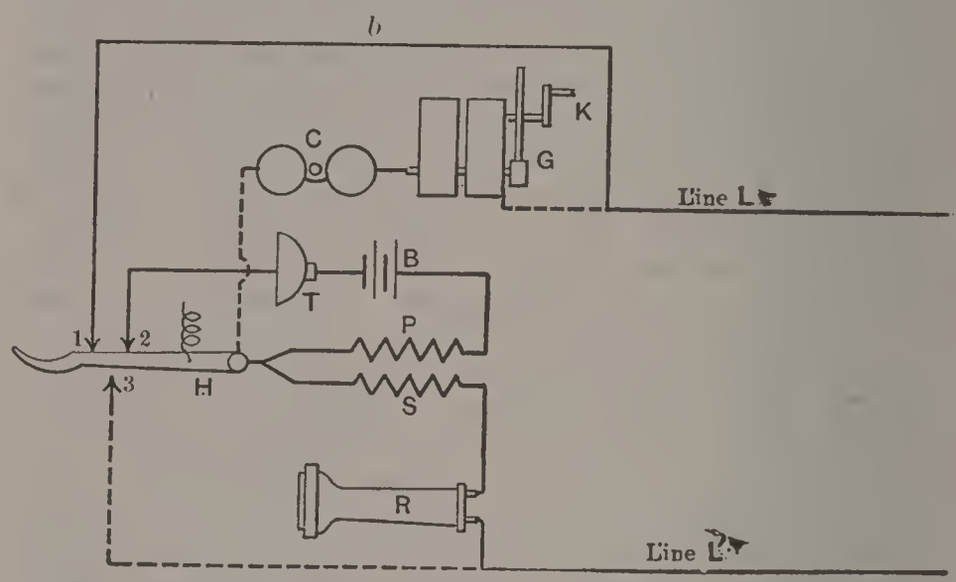


Fig. 3.

materials which would ensue were the battery constantly to send its current through the circuit. This arrangement is shown in diagram in Figs. 3 and 4. *T* is the

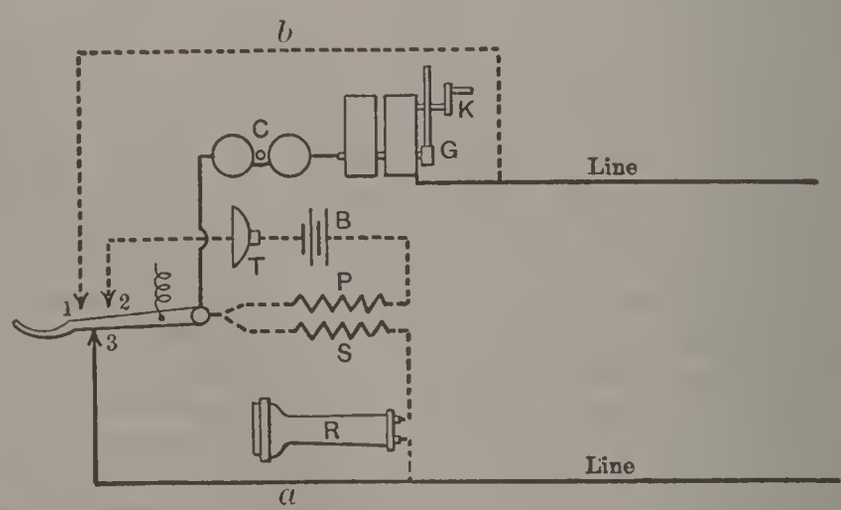


Fig. 4.

transmitter, *B* the battery, *R* the receiver, *C* the call bell, *G* the magneto (an alternating current dynamo operated by hand crank *K*). *P* and *S*, the primary and secondary

windings, respectively, of the induction coil. When the telephone is not in use, the receiver rests upon a hook, which is normally held up by a spring, so that when the receiver is taken off and its weight removed from the hook, the latter flies up to its upper position, closing the contacts *1* and *2*, and opening the contact *3*. This is the talking position. It will be noticed that the contacts *1* and *2*, when closed, permit the battery to send its current through the transmitter and the primary winding of the induction coil. They also provide a path around the ringing mechanism, thereby taking the resistance of this apparatus out of the talking circuit. The electrical resistance of the magneto generator bell is necessarily high, and this method of bridging around them with a path of low resistance greatly adds to the efficacy of the telephone set.

Referring to Fig. 3, which represents the apparatus with the receiver hanging on its hook, it will be seen that the path of an incoming current is through the magneto and the bell, thence by way of the hook and contact *3* out to the other side of the line. If an alternating current is sent out from the distant station, it will be received and the bell will ring; but this current, it will be noticed, is prevented from going through any part of the receiver, transmitter or induction coil, thus allowing all its energy to be expended in ringing the bell. In response to the call thus received, the receiver is taken from the hook, putting the apparatus in the condition depicted in Fig. 4. In this, the path of currents over the line is by way of the short cut around the ringing devices, through the hook and the secondary or fine winding of the induction coil and the receiver, and thus back to the line. Current from the battery circulates through the transmitter, the hook and contact *2*, and the primary or coarse winding of the induction coil. In this position both transmitter and receiver are ready for operation, and conversation can be proceeded with. When conversation is finished and the receiver is again hung up, everything returns to the first position shown in Fig. 3, thus leaving the apparatus ready to receive another call or to send one out.

A telephone exchange or central office consists of a collection of apparatus whereby the numerous lines coming in from its subscribers' telephones may be connected together at the will of the subscribers, so that one may talk with another, and may be disconnected when conversations are finished, leaving these lines ready for other connections. The apparatus used is essentially very simple, but in practice is of enormous complexity, owing to the great number of telephone lines that center in many modern exchanges. In its detail the apparatus required for each incoming line, consists of an annunciator, a form of terminal connections such that the operator, noticing that a call has been received from a particular line, may connect with it a local receiver so as to receive

the orders of the subscriber, this being done by means of flexible connecting wires. The circuit of the calling subscriber is connected to that of the subscriber to whom he desires to speak, and by means of a switching arrangement included in the circuit of the flexible cord connection, a calling signal is sent out over the second or called line, ringing that subscriber's bell and notifying him that he is wanted at the telephone. A second annunciator, included in the same cord circuit, is so arranged as to give a visible indication when the two subscribers have finished their conversation, so that the flexible connections, line terminals and other apparatus may be restored by the operator to their original condition.

Subscribers' terminals end on the switchboard in what are known as 'jacks.' Essentially, a jack consists of a tubular opening containing electrical contacts at its bottom end and on its wall, so that a plug thrust into it makes contact on its tip and sides, respectively, with these connections. This plug is attached to one end of a flexible conducting cord, containing two wires, in the middle of which is connected the 'clearing-out,' or 'conversation-ended' annunciator, and also a key for connecting the wires in the cord with a source of alternating currents for bell-ringing. The other end of the same cord is provided with a similar plug, which may be thrust into the jack of the called subscriber, thus permitting the alternating current to flow out through the line and ring his bell.

The fact that the complexity of switchboards and exchange apparatus increases out of all proportion with the increasing number of lines connected, explains the apparent paradox in telephone operation, that the larger the number of subscribers in a given exchange, the more it costs proportionately to handle the business done for each subscriber.

A recent improvement of great importance has been introduced in telephone exchange operation. Instead of providing a local battery for each transmitter, the transmitters are operated by currents sent out from a large battery at the central office itself. At the same time, appropriate connections with the hook switch at subscribers' instruments enable the sending in to the exchange of the signal that the attention of the operator is desired, by simply removing the receiver from its hook, instead of turning the handle of the magneto. This action causes the annunciator lamp on the switchboard over the subscriber's incoming jack to light, and the operator, noticing this lamp, inserts the plug of a cord circuit into the answering jack for that line in her section, thus being able to receive the order for connection, which is made in the method described above. This system of telephone operation is known as the 'common battery' or 'central energy' system, and has lately been introduced in nearly all large central exchanges.

Automatic telephone systems have been devised which

enable a subscriber to connect his telephone to any other one without first calling a central operator and waiting for her to select the line wanted and call by the method previously described.

In a system providing for 100 subscribers, there are placed at a central location 100 electrically operated switches. In each of these switches there are 100 pairs of fixed contacts. Each subscriber's line wires are joined to a pair of these contacts, similarly located, in all of the switches. These terminal contacts are arranged in ten horizontal rows of ten each, the rows are placed so that their left-hand ends are in a vertical line. The subscribers' telephones numbered 11, 12, 13, 14, 15, 16, 17, 18, 19, 10, are joined to the contacts in the bottom or first rows in each switch, in the order indicated above; 21, 22, 23, 24, 25, 26, 27, 28, 29, 20, are in the second rows; the third rows begin with 31 and end with 30, and so on. 10, 20, 30, etc., are placed out of their usual order, and 01, 02, 03, 04, 05, 06, 07, 08, 09, 00, are placed in the top or tenth row in each switch, for a reason indicated later.

Each subscriber's line is also joined to a pair of contacts that may be moved step by step so as to touch, successively, each pair of fixed contacts in one switch assigned to his use. These contacts, mounted on a suitable movable arm, remain normally one step below a point opposite the left-hand end of the first row of fixed terminal contacts.

If a subscriber, say number 36, wishes to call another, say number 79, he causes a circuit, formed by one line wire and ground return, to be closed seven times by 'pulling a dial' or other equivalent operation at his own telephone. Each time this circuit is closed a current flows and causes an electromagnet to pull the movable switch contacts upward one step. Seven pulls, then, brings them up, seven steps, to a point opposite the left-hand end of the seventh horizontal row. Another circuit formed by the other line wire and ground is automatically closed once at the end of the operation. This single impulse sets the switch so that another electromagnet pulls the contacts over into the horizontal row nine steps when the dial is pulled again closing the first circuit nine times, thus leaving movable contacts touching the ninth pair of terminal contacts in the seventh row. These contacts, as stated before, are joined permanently to the line leading to subscriber number 79. The telephone of number 36 is now joined to number 79, through the switch, and by sending a ringing current over the lines, usually by pushing a button, he rings a bell at number 79. If he wishes to call number 70 he sends seven impulses over the line as before, thus bringing the movable contacts up seven steps, ten impulses over the other line brings them over ten steps, leaving them touching the tenth or last pair of fixed contacts in the seventh row. In pulling a marked dial from 0, the circuit is closed ten times, since the 0 follows 9 on the dial. For this reason all numbers end-

ing in 0 must be placed in the switch after 9, out of their regular order; for the same reason, numbers smaller than 10, like 02, 07, etc., must be placed in the tenth or top row. Two operations are always necessary to get a number.

When they are through talking, suitable automatic devices, operated by putting the receiver on the hook, cause the movable contacts to return to their normal position, ready for another call.

If some subscriber should call either 36 or 79, while they are talking, he could not ring the bell nor hear them talk, but he would hear a signal in his receiver informing him that the line wanted is busy.

When more than 100 subscribers are to be served, the system becomes more complicated, but all the operations required to join two lines are performed by first and second selector and connector switches at the central exchange. Suppose the exchange serves 10,000 subscribers; there will be 10,000 first selector or individual switches, arranged in ten groups, each group containing 1,000. Switches numbered from 1000 to 1999 are placed in the first thousand group, those numbered from 2000 to 2999 in a second group, and so on. Each thousand group is divided into ten groups of 100 each. These 100 groups are mounted on shelves on the racks, and each group has its own group of second selector and connector switches.

When a subscriber pulls his dial from a number, say 3, his first selector switch moves up and over into the third horizontal row, which contains contacts joined to trunk lines leading to second selector switches, one of which will, when the dial is pulled again, connect his line to a particular hundred group in the third thousand group. When the dial is pulled again two times, a connector switch, joined to the trunk selected by the second selector switch, picks out the number wanted in this group just as it is done in the 100 system. Four operations like pulling a dial are always required to call a number in this system. In a system serving more than 10,000 and less than 100,000 subscribers, five operations will be necessary.

TEL'EPHOT, or TELEPHOTE: an instrument perfected in 1903, designed to reproduce scenes at a distance, by the aid of electricity. Telephotography is likely to prove useful both for scientific and industrial purposes, as well as in warfare. The physicist will be able to photograph any phenomenon visible at the extreme horizon, such as mirages, etc., as well as those which he could not approach himself without danger, such as, for instance, volcanic eruptions. The naturalist may now safely observe wild animals and photograph them from a distance. The amateur astronomer will be in a position to take splendid views of the principal heavenly bodies. The explorer of Arctic regions will observe distant and inaccessible points.

TELESCOPE, n. *tĕl'ĕ-skōp* [Gr. *tēlĕ*, afar off, *skopĕō*, I view]: instr. employed to assist the naked eye in viewing distant objects, especially the heavenly bodies: V. to slide or be driven into each other, as the parts of a telescope which slide into each other—especially said of railway trains in collision. TEL'ESCOPING, imp. TEL'ESCOPED, pp. *-skōpt*, driven, one within the other, e.g., colliding railway carriages. TEL'ESCOP'IC, a. *-skŏp'ĭk*, or TEL'ESCOP'IAL, a. *-ĭ-kăl*, pert. to a telescope; visible only through a telescpoe, as a star; far-seeing. TEL'ESCOP'ICALLY, ad. *-lĭ* TELESCOPY, n. *tĕl-ĕs'kō-pĭ*, tne art or practice of using or making telescopes.—The *Telescope* consists essentially of a Lens (q.v.) or mirror, to form, within our reach, an image of a distant object; and a Microscope (q.v.), to examine this image in detail. Its invention is ascribed to various individuals living about the end of the 16th c.; but there is no doubt that Galilei (q.v.) was the first to apply it to any purpose other than the gratification of curiosity.

It is proposed here to give, *first*, a general idea of the mode in which a telescope acts, incidentally showing how the magnifying power and the brightness of the image depend on the dimensions of various parts of the instrument; *second*, to point out the various causes of imperfection, which in all telescopes are unavoidable, and how these are reduced to as small an amount as possible; *third*, to mention the most important of the many forms which have been devised, and the processes of constructing these delicate instruments.

When a lens is employed, as in a camera obscura, to form an image of an object, as AB in fig. 1, the distance

Fig. 1.

of the image from the lens depends on the focal length of the lens, also on the distance of the object. Practically, with telescopes, the distance of the image from the lens is, on account of the remoteness of the object, the focal length of the lens. Also the image of any point, A, of the object lies in the prolongation of the line joining A with the centre, C, of the lens. Join AC, and produce it to *a*, C*a* being made equal to the focal length of the lens, *a* is the

Fig. 2.

point at which the image of A is formed. Similarly at *b* the image of B is formed. Thus the image is *inverted;* and, seen from C, the image and the object subtend equal angles, or look equally large. When a concave mirror

forms an image, the effect is as in fig. 2, where C is now the centre of the sphere of which the mirror is a portion. When the object, AB, is at a great distance, the image, *ab*, is *inverted*, and is formed half way between C and the mirror. As before, object and image subtend equal angles at C. To see these images, the eye must be placed at some such point as E in each of the figures.

So much for the formation *within our reach* of an image of a distant body. We must next show the action of a lens when employed to magnify this image. When an object, as *ab* in fig. 3, is placed rather nearer to a lens than its focal length, rays which pass from the object through the lens appear to have come, not from the object, but from an enlarged image as $\alpha\beta$, at a greater distance from the lens —but subtending, as before, the same angle at the centre, *c*, of the lens. In practice, the lens is so adjusted as to form the image, $\alpha\beta$, at a distance of about ten inches from *c*, in which case the eye sees it most distinctly, and the distance of *ab* from the lens is then (practically) the focal length of the lens.

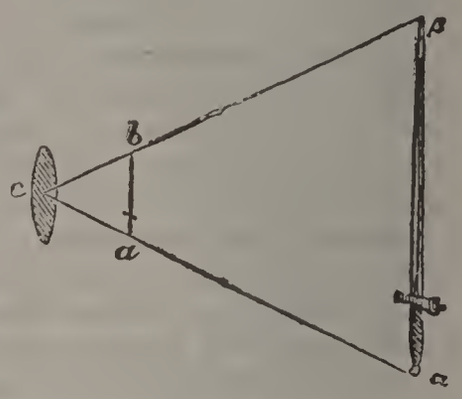


Fig. 3.

We now combine the first and third diagrams, and we have the *Common Astronomical Telescope.* The magnifying power is obviously to be measured by the increase in the angle subtended by the image, $\alpha\beta$ (fig. 4), over that subtended by the object AB. The angle at C is the measure of the apparent size of the object; that at *c*, of the apparent size of the image. And it is easy to see from the quadrilateral C*acb* in the figure that these angles are inversely as the sides C*a* and *ac* (for instance, if C*a* have six times the length of *ac*, the angle at C will be only one-sixth of that at *c*). Hence the magnifying power is to be found by dividing the focal length of the object-lens by that of the eye lens. In practice, the lenses are so mounted in tubes that their distance may be increased or diminished at pleasure. When the object, AB, comes nearer the observer, its image, *ab*, is formed *further* from

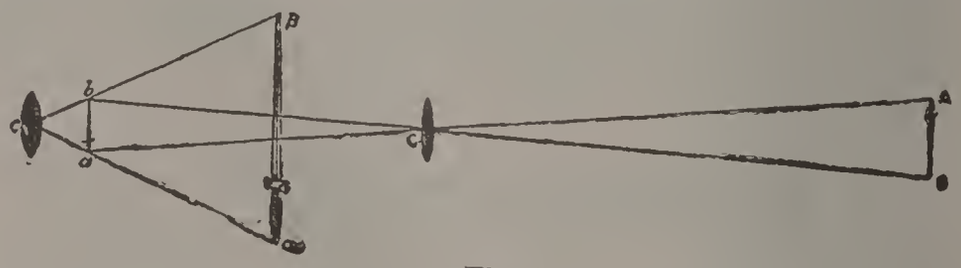


Fig. 4.

the lens C. Hence, for near objects, the telescope requires to be pulled out. Again, the distance of most distinct vision differs for different people, so that even when AB

is at a fixed distance, short-sighted and long-sighted eyes require the eye-lens to be removed from, or advanced to *ab*, so that for each eye $\alpha\beta$ may be formed at the distance at which it can be most distinctly seen.

To estimate the relative brightness of the image and object, suppose, for simplicity, all the light which enters the telescope from the object to reach the eye. Then the quantity of light which enters the eye from the image, is greater than that which would enter the unaided eye from the object, in the ratio of the aperture of the object-glass, C, to the aperture of the pupil of the eye. But it is spread over a magnified image. If the image be as much larger than the object as the object-glass is larger than the pupil of the eye, the object and image will appear equally bright. Taking the aperture of the pupil as $\frac{1}{10}$ inch, the object-lens would require an aperture of 10 inches, with a magnifying power of 100 times, in order that brightness should not be lost. Practically, the most formidable difficulty in attaining very high magnifying powers is that due to the enormous sizes of lenses and mirrors which are required to give the necessary brightness to the enlarged image. It is easy to see that it is impossible to render the final image brighter than the object, by any increase of dimensions in the object-lens.

From the above notice of the common astronomical telescope, the construction of the Newtonian or Herschelian reflecting telescope may be understood from a combination of figs. 2 and 3.

We proceed to the second theme—the unavoidable imperfections of the telescope, and their reduction to a minimum.

In the first place, even with a mirror—where we are not annoyed by the breaking up of white light into its component colors, since the law of Reflection (q.v.) is the same for all rays—it is impossible to form a perfectly sharp image of more than *one* definite point at a time. To do even this, the mirror must be formed as part of the prolate spheroid produced by the rotation about its longer axis of an Ellipse (q.v.), one of whose foci is the object-point, the other the image. If the object-point be, like a star, practically at an infinite distance, the requisite form of the mirror is that formed by the rotation of a Parabola (q.v.) about its axis. The axis of the mirror must then be directed to the object-point, and all rays from it will, after reflection, pass accurately through the focus. But this is not strictly true for any other object-point in the field of view, though so nearly true that no practical inconvenience results from it. But, if the mirror used be part of a sphere, no point can be found such that rays diverging from it shall all be brought after reflection accurately to one point of the image; and this defect, called *Spherical Aberration*, increases proportionally to the surface of the mirror; so that by increasing that surface, for attainment of brightness we increase proportionally the indistinctness of the image. To give an idea of the delicate manipulation required in constructing a reflecting telescope, we take

the case of a speculum of 4 ft. aperture and 40 ft. focus, as calculated by Sir J. Herschel. If this be first ground to a truly spherical form, it must have a radius of 80 ft., as we have seen above. Now, such a mirror will give a very indistinct image, even under the most favorable circumstances; yet to grind it to the parabolic form, which is practically perfect, leaving the middle untouched, and grinding more and more away from its surface as we proceed outward to the edges, even at the edges we have to remove a film of metal of only the $\frac{1}{21333}$ part of an inch about the $\frac{1}{100}$ part of the thickness of the paper on which this is printed.

Lenses, whether the object-lens or the eye-lens, have this defect also; but, as a rule, the spherical aberration in lenses is almost negligible compared with *Chromatic Aberration,* which arises from the different refrangibilities (see REFRACTION) of the various colored rays; and leads to the formation, by a lens, of a separate image of a bright object for each colored ray. The remedy consists in *achromatizing* (see ACHROMATIC: REFRACTION) the lens—i.e., forming it of two or more lenses of different kinds of glass—so that the colors, separated by one, shall be reunited by the others. With a double achromatic lens, in which a convex lens of crown-glass is united to a concave of flint-glass, the focal lengths of the separate lenses can be easily adjusted so as to bring, when in combination, any two assigned rays of the Spectrum (q.v.) simultaneously to a focus; and, by judicious selection of these two rays, we may reduce the consequences of irrationality of dispersion (see REFRACTION) to a minimum. But this is not all. To construct a lens of a given material which shall have a given focal length, is an *indeterminate* problem; we may assign the curvature of either surface at pleasure, and then that of the other is definite, and can be calculated. Thus, the achromatism of a double-lens can be secured in an infinite variety of ways; and we may impose further conditions; i.e., that the curvatures of the convex and concave surfaces shall be adjusted so as to destroy as far as possible the spherical aberration. Other imperfections, such as those due to DIFFRACTION (q.v.), etc., can be here merely alluded to as they do not admit of popular explanation within reasonable limits. Nor can we enter on questions connected with the correction of chromatic and spherical aberrations in eye-pieces, which is effected by combination of two or more lenses (generally of the *same* material) placed at a certain distance from each other. We note only that the defect (for terrestrial purposes) of the common astronomical telescope, the inversion of the image, is overcome by combining two such telescopes, the smaller to examine the image formed by the larger, and therefore to reinvert it. This practically comes to constructing the eye-piece of three lenses at a distance from each other; though, for greater distinctness, four are usually employed.

In the earliest, or Galilean, telescope, the eye-lens is concave; a construction now used only in opera-glasses. It

has far less chromatic and spherical aberration than the common astronomical telescope, and is shorter, since the distance between the lenses is the *difference*, not the *sum* of their focal lengths; but it has a very serious defect in the smallness of its field of view. This can be enlarged, as in opera-glasses, only by making the diameter of the object-lens disproportionately great.

Before the discovery of the possibility of forming an achromatic lens, Huyghens, Cassini, and others, had endeavored, by enormously increasing the focal length of the object-glass of the common astronomical telescope in proportion to its diameter, to get riddance as far as possible of chromatic aberration. This was called the *aërial* telescope, as the object and eye lenses were mounted separately on stands; the tube (which would have been 100, 200, or even 600 ft. long) being dispensed with. Valuable work was done with some of these telescopes, of 125 ft. focus; but the longer ones proved unmanageable. The principle involved in these constructions is, practically, the throwing the magnifying power more on the object-lens than on the eye-lens; as the image formed by the former was still so imperfect as not to bear much additional magnification; though achromatic eye-pieces could even then be made with one kind of glass. The great step required for shortening the unwieldy instrument was therefore the perfecting of the object-lens. We have seen how this was effected. Various very ingenious improvements on achromatic combinations, even yet (we incline to think) worthy the consideration of opticians, were devised by Dr. Blair. He obtained in solutions of mercury or antimony in hydrochloric acid, media, in which, while much more refractive and more dispersive than crown-glass, no irrationality of dispersion as compared with crown-glass could be detected. With these fluid lenses he was enabled to give the telescope an aperture of one-third of its focal length without a trace of residual color. The *dialytic* telescope, invented 1828 by Rodger, and since made by Plössl, promised well. Its object is to obtain a large aperture for the telescope with a flint-lens (the obtaining of which, in large and perfect disks, is the great difficulty) of moderate size. In this telescope the object-lens is single, and of crown-glass; having, of course, all the defects of the single lens. These are corrected, at some distance in the cone of converging rays, by interposition of a combination of a pair of much smaller lenses, whose focal lengths are equal for red rays; the first being a convex lens of crown, the second a concave of flint, glass. The adjustments of this instrument for exact correction are, a motion of the pair of lenses to or from the object-lens, to correct chromatic aberration; and a change of the distance between the two smaller lenses, to correct spherical aberration.

Chromatic being so much more serious than spherical aberration, it is not to be wondered at that the idea of substituting an object-mirror, in which the former is absent, for an object-lens, was early suggested. The first practicable scheme for the purpose seems to have been that

of Gregory; in which, however, two mirrors are employed. In the skilful hands of Short, this instrument completely superseded the ordinary astronomical telescope. Its chief defects are, the great loss of light by two direct reflections, and the increase of the spherical aberration by the fact that both mirrors are concave. The first defect is incurable, the second was partially overcome by Cassegrain's plan of using a small *convex* mirror for the second reflection. To Newton is due the simple idea of using the combination of a single curved mirror with a plane mirror and an eye-piece; a construction differing only in slight particulars from that now universally adopted for reflecting instruments. Newton constructed several such telescopes with his own hands, some of which are still preserved, e.g., one in the apartments of the Royal Soc. at Burlington House.

The elder Herschel constructed for himself all the instruments, gradually increasing in magnitude and optical power, by means of which he made his grand discoveries; and his son worthily succeeded him, both as constructor and as observer.

The gigantic telescopes of Lord Rosse and Mr. Lassell are wonderful examples of delicate art, and have had their full share, with the large achromatics of the present day, in the startling discoveries of modern astronomy.

The process of Liebig for depositing on glass an exceedingly thin film of silver, which, by careful polishing, can be rendered more highly reflective than any other material, was applied by Steinheil in the construction of large specula. This is an immense step, since any disk of glass will suffice, its optical properties not being employed; while, if it be once brought to a true parabolic figure, the silvering may be renewed as often as requisite. One of the great difficulties in the construction and working of large reflectors has hitherto been the casting and annealing of metallic masses of a few tons' weight: this, in the silvered specula, is entirely avoided. We cannot here enter into a description of the processes, often extremely ingenious, devised for the grinding, figuring, and polishing of lenses and specula.

For telescopes in the United States, see OBSERVATORY The most successful telescopic lenses of large size have been by Lewis M. Rutherford of New York, for his own photographic work; and by the late Alvan Clark of Cambridge, Mass., for the great observatories—the making now continued by his sons.

The Yerkes Telescope.—The largest refracting telescope in the world was built by order of Charles T. Yerkes, a railroad magnate of Chicago, for the Yerkes Observatory founded by him at Lake Geneva, Wis., as part of the equipment of the Univ. of Chicago. The object-glass of this instrument is 40 in. in diameter, four inches larger than that of the T. in Lick Observatory (q.v.). The disks, ground by Alvan G. Clark & Sons, of Cambridgeport, Mass., were made by M. Mantois, of Paris. They were mounted by Warner & Swazey, of Cleveland, O. The telescopic tube,

made of steel in three sections, without the eyepiece, measures 62½ ft. The diameter of its largest end is 53 in. Its greatest thickness is in the middle section, which is ¼ of an inch thick; its total weight is 12,000 lbs. Nearly three years were spent in making the lens, whose focal length is 64 ft. and whose aperture is 41½ inches. The crown lens, which weighs 205 lbs., is 3 inches thick in the centre and 1¼ inches thick at the edge; the weight of the flint lens is 310 lbs., and the total weight, including the metal ring, is nearly 1,000 lbs. The crown and flint lenses are 7 inches apart. About $100,000 was paid for the lens, its glass plates alone co-ting nearly half this sum. The total length of the T. is 75 ft. The movable part of the instrument turns on the polar axis, which is a steel rod 13 inches long and 15 inches in diameter. The declination axis, which is of hardened steel, is 12 inches in diameter and weighs nearly 4,000 lbs. The entire apparatus is set within a dome, on a movable platform 70 ft. in diameter. This platform, which can be raised or lowered at will, has a range of elevation and depression of 22 ft. It is operated by hydraulic power, and has superseded the high observation-chair. The dome has a diameter of 90 ft., and is fitted with movable shutters which, alike with the dome, are worked by electricity. The clock by which the instrument is turned weighs 2,500 lbs., and is controlled magnetically. The supporting pier, resting on a foundation of solid masonry, is made in five sections, each 7 ft. high. The base section weighs 36,000 lbs., the others about 12,000 lbs. each. The distance from the base of the pier to the centre of motion is 43½ ft. When the object-glass of the telescope is pointed to the zenith it is 72 ft. above the base. The spectroscopic attachments of the instrument consist of a spectroheliograph, a stellar spectroscope, and a solar spectroscope. The principal mechanisms of the instrument are operated by electricity generated in a power-house some distance from the observatory, thus reducing the risk from fire. Owing to delay in construction the observatory was not opened till the summer of 1897.

TELESTIC, a. *tē-lĕs'tĭk* [Gr. *telestikos*, fit for finishing—from *telos*, the end]: relating to a purpose or an end.

TELESTICH, n. *tē-lĕs'tĭk* or *tĕl'ē-stĭk* [Gr. *telos*, the end; *stichos*, a line, a verse]: a poem in which the final letters of the lines make a word.

TELEUTOSPORES, n. plu. *tĕl-ū'tō-spōrz* [Gr. *teleu'tē*, an end, a conclusion; *spora*, seed]: long two-celled spores ending the vegetation of certain fungi, and beginning a new generation in spring.

TELFORD, *tĕl'fĕrd*, THOMAS: civil engineer: 1757, Aug. 9—1834, Sep. 2; b. in the valley of the Megget, Scotland; son of a shepherd, in Eskdale, Dumfriesshire. During the intervals of his attendance at school, young T. followed his father's occupation, diligently employing his leisure moments in perusal of whatever books were within his reach. At the age of 14 he was apprenticed to a stonemason; but found time to study Latin, French, and German, and for various reading. In 1780 he removed to

Edinburgh, where he studied architectural drawing; and 1783 he went to London, obtaining employment under Sir William Chambers, then engaged on his chief work, Somerset House. T.'s merits attracted his employer's notice, and he was appointed 1784 to superintend the erection (through three years) of the resident commissioner's house at Portsmouth dockyard—availing himself of the opportunity for mastering the details of construction of docks, wharf-walls, etc. In 1787 he was appointed surveyor of public works for Shropshire; and his many bridges gained for him the planning and superintendence of the projected Ellesmere Canal, 103 m. in length—a work which occupied him 1795–1805. In 1801 he received a commission from government to report on desirable public works for Scotland (see CALEDONIAN CANAL). In the same capacity he executed more than 1,000 m. of road in the Highlands, Lanarkshire, and Dumfriesshire (see ROAD-MAKING), and erected about 1,200 bridges, besides churches, manses, etc. In 1808, and again 1813, he was invited to Sweden; where he superintended the construction of the Gotha canal, for which he received a Swedish order of knighthood. His next great work was the construction of the road from London to Holyhead, including the erection of numerous bridges—among others, of the Menai *Suspension Bridge* (q.v.)—and the last was the execution of the St. Katharine's Docks in London. His other works—bridges, canals, tunnels, harbors—are too many to enumerate. For the last few years of his life, he retired from the active duties of his profession. He died at Westminster, and was buried in Westminster Abbey.—See *The Life of Thomas Telford, Civil Engineer, written by himself* (1838); Smiles's *Lives of the Engineers.*

TELIC, a. *tĕl'ĭk* [Gr. *telos*, the end]: denoting the final end or purpose.

TELL, v. *tĕl* [Icel. *tala*, speech: Dut. *tellen;* Dan. *tælle*, to count, narrate (see TALE)]: to express in words; utter; relate; reveal; betray; publish; explain; to give an account; count; number; to teach; to produce an effect, as 'every word *told.*' TELL'ING, imp.: ADJ. having or producing a marked effect, as a speech on an audience. TOLD, pt. pp. *tōld*, expressed in words; narrated. TELL'ER, n. *-ĕr*, one who tells (see also next entry). TELL-TALE, n one who officiously gives information of another's private concerns; an instr. or contrivance for giving certain desired information, as the piece of lead, etc., hung outside an organ to show the exhaustion of the wind: ADJ. officiously and heedlessly revealing; babbling; telling tales. TO TELL OFF, to count and detail, as a number of men, for a particular duty. TO TELL OF, to inform about.—SYN. of 'tell': to disclose; divulge; reveal; discover; mention; communicate; impart; report; inform; acquaint; recite; rehearse, repeat; utter; express; relate; speak.

TELL, *tĕl:* district in the extreme n.w. of Africa, along the shores of the Mediterranean, comprising the corn-growing tracts extending s. from the Mediterranean to the

Atlas Mountains, and from w. to e. through Morocco, Algeria, and Tunis: see AFRICA: SAHARA.

TELL, WILLIAM: according to Swiss tradition long accepted, but recently shown to have only the slightest foundation, a patriot who, in the 14th c., rescued his native district from the tyranny of the House of Austria. His story has been variously told. According to the version most current, Hermann Gessler, bailiff (or *landvogt*) of Albert I. of Austria, lived at the castle of Küssnacht, 1307, and perpetrated on the people of the district atrocious cruelties. A league was formed of the principal men of the Walstädte, Uri, Schwyz, and Unterwalden, to resist the Austrian pretensions, and to it belonged Walter Fürst, and William Tell, his son-in-law. Gessler had placed the ducal hat of Austria on a long pole erected in the market-place of Altorf, and gave orders that no one should pass without uncovering his head. T. and his little boy one day took no notice of the hat, and were at once dragged before Gessler, who, hearing that T. had great reputation as a crossbowman, resolved to make his skill a means of punishing him. T. was ordered to shoot an apple from his son's head, and told that if he missed it, he should die: he shot, and hit the apple without injuring the child. Gessler, turning to T., asked him what he meant to have done with a second arrow he had in his girdle. 'To have shot you, if the arrow had slain my son,' was the reply. T. was then seized, bound, and thrown into a boat on the Lake of Lucerne, to be taken with Gessler and his men to the castle of Küssnacht. A sudden Alpine storm sprang up. T. was the only man on board who knew the shore, and could manage a boat in such weather. He was allowed to take the helm, and he soon ran the boat toward a rocky ledge; he there seized his bow and arrows, sprang on shore, and pushed the vessel back into the water. The storm, however, abated, and Gessler and his party landed. T. lay in wait for them in a rocky defile, and shot Gessler through the heart. This was followed by the great Swiss war with Austria—first of a series which lasted till 1499—in which, however, T. took no prominent part. T. was drowned, it is added, in 1350, in attempting to save a friend during a great flood of the river Schächen.

There is evidence that, 1387, a religious service was instituted to commemorate the act of T. at the place where he lived; and that, in the following year, Tell's Chapel was built on the spot where the boat was said to have landed. Russ and Etterlin, chroniclers near the end of the 15th c., told the story as history. Tschudi, in the first part of the 16th c., repeated it in the general form familiar to us and adopted by Schiller in his well-known drama. So early as the end of the 16th c., however, doubts were expressed of its authenticity. Guilmann, in his *De Rebus Helveticis*, questioned the very existence of Tell. What, he asks, has become of his family and relatives? Why was he not spoken of by his contemporaries? Grasser, author of a Swiss *Heldenbuch*, pointed out a striking resemblance between T. and Toke, hero of an old Scandina

vian fable. From that period, incredulity became general, and several books were published to show that the story was merely legendary; and since the beginning of the 18th c. a. library of literature on the subject has appeared in Switzerland, Germany, Denmark, and France. The most important works on the question are (1) Ideler's *Die Sage von Schusse des Tell* (Berlin 1826), in which it is shown that the incident of the apple is purely legendary; (2) edition (1834) of Russ's Chronicle, by Schneller of Lucerne, in which it is proved that serious disparities exist between the versions of the story in the Swiss chroniclers; (3) a work (1835) containing documents relating to early Swiss history, by Kopp of Lucerne, in which it is satisfactorily shown that, though a continuous series of charters exist relative to the bailiffs of Küssnacht in the 14th c., there is no Gessler among them.—Tell is nowhere mentioned in contemporary records; but it need not, therefore, be inferred that an obscure peasant of that name did not exist, who shot an Austrian bailiff on the banks of the Lake of Lucerne, and thus started a revolt. Such incidents, if real, might easily have become connected in tradition with the old fable of the tyrant, the bowman, and the apple, which appears in the legends also of Denmark, Iceland, Norway, Holstein, and England.—For the Tell controversy in full, see Hisely's *Recherches* (1843); and Vischer's *Die Sage von der Befreiung der Waldstädte* (1867).

TELL-EL-AMARNA: a name given to the ruins and tombs of rock, the remains of the ancient royal city of Khut Aten, in middle Egypt, on the east bank of the Nile, near the villages of Hagg Kandil on the south and Et-Tell on the north. They are described as ruins of a city built by Amenophis IV., of the eighteenth Egyptian dynasty. He removed from Thebes, when he abandoned the worship of all gods but Aten, the god of the solar disk, building a new city with palace and temple to Aten, on the present site of El-Amarna, which was occupied for a short time only, so that the course of its streets and plan of its houses may still be traced on the mound.

Petrie unearthed the palace while excavating in 1891-2. Late in 1887, a peasant woman discovered by accident over three hundred cuneiform tablets, which were shown to be letters written to Amenophis III. and IV. by Asiatic kings and Egyptian officials or vassals in Phenicia, Syria and Palestine, of much importance for the history of the Orient. The language of the correspondence was Babylonian cuneiform, which indicated the predominant Babylonian influence. The letters were purchased chiefly by the British Museum, the Berlin Museum and the Gizeh Museum of Cairo.

TELLER, n. *tĕll'ĕr* [F. *taille*, a tally or piece of wood on which an account was kept by notches, which, when completed, was split in two with corresponding notches

on each piece: Eng. *tallier*, formerly an officer in Exchequer who paid and received money, and kept the checks or tallies (see TALLY)]: an officer in a banking establishment whose duty it is to receive and pay out money; one who numbers or reckons votes in a division in a deliberative assembly, as in parliament or the house of representatives. TEL'LERSHIP, n. the office of a teller.

TELLER, HENRY MOORE, LL.D.: lawyer and politician: b. Granger, N. Y., 1830, May 23. He was educated at Alfred Univ., N. Y.; studied law, and was admitted to the bar at Binghamton, N. Y., 1859; removed to Illinois, and thence to Colorado 1861; was elected republican U. S. senator on the admission of Colorado as a state 1876, and was re-elected for 1877-83; was chairman of a special committee on election frauds, known as the Teller committee, 1877-8; was U. S. secretary of interior 1882-85; was re-elected U. S. senator 1885, 1891, 1897 and 1903, retiring Mar. 1909. In 1896 he led the free-silver faction in their secession from the St. Louis national republican convention. In 1897, he was re-elected U. S. senator as an independent silver republican.

TELLEZ, *tĕl-yĕth'*, GABRIEL: better known by his literary pseudonym, *Tirso de Molina:* Spanish dramatist of great reputation: about 1570-1648; b. Madrid. He became a monk 1620, and 1645 became prior of a monastery of his order. Tellez was a friend and pupil of Lope de Vega, whom he almost rivalled in facility of execution. In the preface to his *Cigarrales de Toledo* (1621), a collection of novels and comedies, he reckons the number of dramatic works composed by him at 300; but only 68 are extant. He wrote many other works. Tellez ranks next to Calderon and Lope de Vega as a dramatist. His plays are inartistic, but full of vitality. The delineation of character is piquant and vigorous; the wit abundant, and the language poetical.—The best ed. is that of Don Juan Eugenio Hartzenbusch, in *Teatro Escogido* (12 vols. Madrid 1839-42).

TELLICHERRY, *tĕl-ĭ-chĕr'rĭ:* seaport-town and military station of British India, district of Malabar, 90 m. s.w. of Seringapatam. The site of the town is very beautiful, and the neighboring country highly productive, the low lands producing two, in some cases three, crops of rice in the year. The cocoa-nut tree grows in great abundance, and is put to many uses. For its salubrity, Tellicherry has been called the Montpellier of India. There is a natural breakwater abreast of the fort, formed by a reef of rocks parallel to the shore, having a depth within suitable for ships of 500 or 600 tons. Pop. (1901) 27,883.

TELLINIDÆ, *tĕl-lĭn'ĭ-dē:* family of lamellibranchiate mollusks; having the mantle widely open in front; foot tongue-shaped; siphons separate, long, and slender; shell usually equivalve and shutting close, hinge-toothed. The species are very numerous, and in almost all seas, mostly

living in sand or sandy mud, some at considerable depth. The fossil species also are numerous, and are in the more recent formations. The genus *Donax* belongs to this family.

TELLURAL, a. *tĕl'ûr-ăl* [L. *tellus* (*tellur-*), earth]: of or relating to the earth.

TELLURATE, n. *tĕl'ûr-āt:* in *chem.*, a salt of telluric acid.

TELLURIAN, n. *tĕl-û-rī'an:* an inhabitant of the earth; a tellurion.

TELLURIC, a. *tĕl'ûr-ĭc:* of, pertaining to, or proceeding from the earth; in *chem.*, of, pertaining to, or containing tellurium, especially in its higher valence; as *telluric acid* (H_2TeO_4).

TELLURID, or TELLURIDE, n. *tĕl'ûr-ĭd*, or *rīde:* in *chem.*, compound of tellurium with an element or an organic radical. TELLURIFEROUS, a. *tĕl'û-rĭf'ĕr-ŭs* [from L. *tellurium* and *fero*, bear]: containing or yielding tellurium. TELLURITE, n. *tĕl'û-rīt:* in *mineralogy*, a subadamantine white or yellow tellurium dioxid (TeO_2), which crystallizes in the orthorhombic system: called also *telluric ochre.*

TELLURION, n. *tĕl-lū'rĭ-ŏn* [L. *tellus*, land, *tellūris*, of land]: a philosophical machine for showing how the causes operate which produce the succession of day and night, and the changes of the seasons.

TELLURIUM, n. *tĕl-lū'rĭ-ŭm* [L. *tellus*, land, *tellūris*, of land]: an elementary body, a rare metal, allied to selenium, of a brilliant tin-white color. TELLU'RIC, a. *-rĭk*, pert. to the earth, or procured from it; relating to tellurium, or contained in it as a constituent. TELLU'RAL, a. *-răl*, pert. to the earth. TEL'LURATE, n. *tĕl'lū-rāt*, a salt of telluric acid. TEL'LURET'TED, a. *-rĕt'tĕd*, combined with tellurium. TELLURITE, n. *tĕl'lū-rīt*, a sort of ochre occurring in small white beads or spherical masses, having a tinge of grayish yellow. TEL'LUROUS, a. *-rŭs*, composed of one equivalent of tellurium and two of oxygen—applied to an acid.—*Tellurium* is a silver white metal, atomic weight 127.6, melting point about 453° C., and specific gravity 6.25. It is brittle, not changed by exposure to the air; when heated a little above its melting point, it boils and condenses again in the cool portion of the retort as metallic drops. In chemical properties it is very like sulphur. It unites with chlorine, readily forming $TeCl_2$ and $TeCl_3$. The oxides TeO_2 and TeO_3 are analogous, yet differ considerably from SO_2 and SO_3. Tellurious and telluric acids and the salts derived from them are also known. Tellurium forms a compound with hydrogen analogous to H_2S and possessing an even more disagreeable odor.

This element resembles sulphur in imparting very undesirable properties to metals even when present in very small amount. If tellurium and any of its compounds are

introduced into the human system, they give the breath a very strong and disagreeable garlic-like odor. To obtain the free element, the ore is digested first with sulphuric acid; hydrochloric acid is then added in small quantity, and the whole treated with sulphurous acid, which precipitates the tellurium.

Tellurium was discovered by Mueller von Reichenstein (1782) in a specimen of gold ore from Austria. Klaproth named it from the Latin *tellus,* meaning the earth. Tellurium occurs free, but most commonly in company with gold, silver, lead, and bismuth. Native tellurium is found in considerable quantity in Boulder co., Colorado. The other important minerals containing tellurium are sylvanite, calaverite, pelzite, hessite, and tetradymite. They are found principally in Austria, and in the United States in Colorado and adjacent states.

TELODYNAMIC, a. *tĕl'ō-dī-năm'ĭk* [Gr. *tēle,* afar, and *dunamis,* power]: of, related to, or used in the transmission of power to a distance.

TELONISM, n. *tĕl'ō-nizm* [from Gr. *telos,* end]: pseudonym formed from the final letters of a real name, as N.S., standing for Joh*n* Anst*is*.

TELOTYPE, n. *tĕl'ō-tīp* [from Gr. *tēle,* afar, and *-type,* suffix]: printing telegraph, or a telegram printed by it.

TELPHER, a. *tĕl'fėr* [Gr. *tēle,* afar; *pherin,* to carry]: pertaining to carriage by the special mode of electrical transport called *Telpherage.* TEL'PHERAGE, n. *-fėr-ăj.* Both the system and the word 'telpherage,' which means 'distance carrying,' were introduced by the late Fleeming Jenkin. He recognized the ease with which the electric motor could be adapted to automatic transportation of materials and he devised a system which when put into service gave satisfaction. This consisted of two overhead cables, mounted on stout poles, along which light carriers were hauled by means of one or more electric motors. To transmit current to the motors, the cables were cut into sections, adjacent sections of one cable being insulated from each other, but cross-converted with sections of the other cable so as to form two continuous conductors, each lying alternately on the right and on the left of the system. The trains were somewhat longer than the sections of cable, so that one end rested on one conductor, while the other was on the second, thus completing the electric circuit.

Modern telpherage systems are more elaborate than Jenkins'. The current is transmitted to the motors by means of a small trolley wire erected over the running cable or rail. Sometimes a double trolley system is adopted. The telpher or towing vehicle is usually equipped with two motors. These may be placed on opposite sides of the cable or side by side. The driving wheels are mounted directly on the motor shafts, as gearings are not

used. The carrier way is attached to the telpher or to a trailer, and is often fitted with a third motor for hoisting the load. When heavy loads are to be carried, two supports may be used, each having one or more running wheels. When the system is not automatic it is controlled from one station, or an operator is carried with the train.

Where heavy weights are to be transported, the cable is supported between the posts by a suspension cable, or a rail takes the place of the cable. In any case, a rail is used when a corner is to be turned, and in running through buildings where the cable construction would be difficult.

The advantages claimed for the telpherage system are economy in cost of transporting and a capacity for moving large quantities of material with a low cost of construction as compared with a railway. Further, the system may be erected overhead and out of the way. Telpherage systems are now used in industrial works of all kinds for carrying materials in a building as well as outside. The system may also be adapted to other work, such as excavating trenches, canal construction, etc. See *Telpherage,* by Chas. M. Clark; *Transactions American Institute Electrical Engineers,* Vol. XIX., p. 391.

TELSON, n. *tĕl'sŏn* [Gr. *telson,* a form of *telos,* a limit]: the last joint in the abdomen of crustacea; the tail-piece.

TEMBU, *tĕm-bô'* (*Abatembu',* or *Tamboo'kie*): tribe of about 90,000 Kafirs, in the region e. of the original boundary of the Cape Colony, where it forms the e. limit of the dist. of Queenstown; now under British authority.

TEMERITY, n. *tĕ-mĕr'ĭ-tĭ* [F. *témérité*—from L. *temerĭtas or temerĭtātem,* rashness—from *temĕrĕ,* rashly: It. *temerità*]: unreasonable contempt of danger; rashness; foolhardiness.—Syn. of 'temerity': hastiness; recklessness; venturesomeness.

TEMESVAR, *tĕm-ĕsh-vâr':* Hungarian city, chief town in s.e. Hungary, the strongly fortified seat of the commander of the Banatish-Servian milit. frontier; on the Bega canal, about 300 m. s.e. of Vienna, with which it is connected by railway. Of the population about half are Germans, a seventh Magyar, and the rest Roumanians, Jews, and Servians. In Temesvar are a fine cathedral, an ancient castle, a magnificent episcopal residence, an armory, barracks, and a theatre. Temesvar is a neat and pleasant town, a favorite place for residence. There are manufactures of cloth, silk, paper, and oil; and brisk transit trade in grain, wax, honey, and brandy, with Transylvania, Servia, and Roumania. Temesvar has endured many sieges—the latest 1849, when it was bombarded 107 days by the Hungarian insurgents, until relieved by Marshal Haynau. Pop. (1900) 53,033.

TEMPÉ, *tem'pā,* Vale of: narrow valley or glen, about 4½ m. long, in n.e. Thessaly, between Olympus

(q.v.) and Ossa (q.v.), through which flows the river Peneus. The classic poets (none of whom seem to have seen the glen) praise it for its matchless beauty; hence the name became a synonym for any lovely sequestered vale. In fact, however, the scenery is characterized by wild grandeur rather than by soft sylvan charms. TEMPEAN, *tĕm-pē'ăn,* a. of, or pertaining to, or resembling.

TEMPER, v. *tĕm'pėr* [F. *tempérer,* to qualify, to temper—from L. *temperārĕ,* to mingle in due proportion, to qualify—from *tempus,* time, fit season: It. *temperare*]: to mix so that one part qualifies the other; to qualify; to make fit; to unite in due proportion; to beat together to a proper consistence; to form to a proper degree of hardness, as metals; to soften; to mollify; in *OE.,* to accommodate; to modify; to govern: N. a mixture of different qualities in due proportion; the state of a substance made up from the mixture of various ingredients; the state or constitution of the mind; disposition of mind, good or bad; mood; irritation; the state of a metal, especially as to its hardness. TEM'PERING, imp.: N. preparing of steel or iron to render it more compact, hard, and firm, or more soft and pliant (see STEEL): ADJ. mixing and qualifying; softening; hardening. TEM'PERED, pp. *-pėrd,* hardened: ADJ. disposed, as in GOOD-TEMPERED, a. well-disposed; not irritable or passionate; the opposite of BAD-TEMPERED. TEM'PEREDLY, ad. *-lĭ.* TEM'PERAMENT, n. *-pėr-ă-mĕnt,* natural organization or constitution; due mixture of different qualities; the peculiar physical and mental character of an individual (see below): in *music,* a system of compromises in the tuning of organs, pianofortes, and the like (see below). TEM'PERANCE, n. *-ăns* [F. *tempérance*—L.]: habitual moderation in indulgence of the natural appetites and passions; sobriety; calmness; sedateness; in *O.E.,* temperature. *Note.*—In *common usage,* TEMPERANCE has become synonymous with abstinence from alcoholic liquors (see below: also TOTAL ABSTINENCE).—SYN. of 'temper, v.': to compound; mingle; mollify; soothe; calm; assuage; soften;—of 'temper, n.': mind; disposition; character; frame; humor; mood; irritation.

TEMPERA, n. *tĕm'pėr-ă* [It.]: a kind of painting in which the pigments are mixed with chalk or clay, and diluted with weak glue or size, used chiefly in scene-painting and the decoration of rooms; called also *Distemper* (q.v.).

TEM'PERAMENT, in Music: system of compromise in keyed instruments for avoiding the necessity, presupposed by the strict relation of musical intervals, of having a separate row of keys corresponding to each tonic. Taking C as key-note, the ratios of the notes of the diatonic scale, as derived from the number of vibrations in a given time of a string sounding that note (see MUSIC), are:

C	D	E	F	G	A	B	C
24	27	30	32	36	40	45	48

The intervals between these notes are not equal, and may be thus expressed in numbers by logarithms:

C D E F G A B C

51 46 28 51 46 51 28

We have here three species of intervals, of which those represented by 51 are called major tones; those by 46, minor tones; and the smaller intervals represented by 28, semitones. These intervals will evidently serve only with C as key-note. If, e.g., we start from D instead of C, we find E a tolerable, though not quite correct, second to D; but the third and seventh of the scale are entirely wrong. Were the major and minor tones equal, and each semitone exactly half a note, the insertion of a note in the middle of each tone dividing the seven intervals would make it indifferent where the scale began, any one of the 12 notes becoming alike available as a key-note; and though such equality is contrary to the immutable principles of harmony, an arrangement based on it is found practically to give but little offense to the ear. In what is called the *equal temperament*, the 12 intervals all are of the same length, and no advantage is given to one key over the rest. This is, in theory at least, the temperament adopted in the pianoforte. Another system, known as *Smith's* or the *vulgar temperament*, in which some keys were favored at the expense of others, has been much used in organs in some countries. While the keys of B♭, F, C, G, D, and A are more perfect than on equally tempered instruments, E♭, A♭, D♯ and F♯ contain some very harsh intervals. The bad fifths and thirds which exist in these keys are designated by musicians as *Wolf* intervals. This mode of tuning the organ is being abandoned for the equal temperament, or an approximation to it. The different characters of the various keys often observed on pianoforte and the organ could have no existence were the temperament absolutely equal; and they arise from the fact that this strict equality is not altogether adhered to in practice.

TEMPERAMENT: a characteristic trend to the intellectual, emotional, and volitional life of an individual. The fundamental differences between people, their most constant tendencies of attitude and action, are expressed as differences in temperament. Such terms as warm and cold hearted, quick and slow, apply here. The characteristics change so little during life that they are usually regarded as inherited rather than acquired. The common classification of temperaments as choleric, sanguine, melancholic, and phlegmatic goes back to Galen. Kant used the terms light and heavy, warm and cold blooded. Wundt has made the distinctions clearer by basing the four temperaments on two characteristics—strength of feeling and rapidity of its change. Under this view, individuals are congenitally different in the intensity of their

emotional reaction in the same situation and in the persistence of their interests. Wundt regards the man who is strong in feeling and quick to change as choleric. If he is weak in feeling and quick to change, he is sanguine; if strong in feeling and slow to change, melancholic; if weak in feeling and slow to change, phlegmatic.

TEM'PERANCE MOVEMENT, THE: in its broader meaning, a movement to diminish the evils of intemperance, whether by efforts directed toward the personal habits of the drinker, or toward the barter and sale by the dealer. The uniform acceptation of the term temperance has advanced to mean entire abstinence for the individual and prohibition of the trade in drinks for the State. Be it understood that the movement in any phase never interdicts the use of alcohol for medicinal, chemical and mechanical purposes.

History. The origin of the modern movement is attributed to Dr. Benjamin Rush of Philadelphia (1745-1813), one of the signers of the Declaration of Independence, one of the founders of the first medical college in Philadelphia, and professor of chemistry in the college, eminent physician and great philanthropist. He published, 1785-7, a series of articles on *The Effect of Ardent Spirits on the Human Body and Mind.* These were printed in pamphlet form 1794 and widely circulated. He urged abstinence from distilled liquors, because of the evil effects upon morals, mind and body. In this educational effort Dr. Rush was supported by Benj. Franklin, Gen. Putnam and Dr. Belknap, and the literature was distributed by the Society of Friends, of which Dr. Rush was a member, and which society had placed in their discipline a clause against the use of ardent spirits, 1784. Prior to this time, 1744, John Wesley had inserted among the rules of early Methodists a prohibition against 'drunkenness, buying or selling spirituous liquors, or drinking them unless in cases of extreme necessity.'

The first temperance society of this country was organized in Boston 1813, Feb. 5, the result of a resolution recommended by Rev. Dr. Lyman Beecher to the General Association of the Congregational Churches, 1812, May, urging parents to exclude ardent spirits from their families, and church members to refrain from buying, selling or using them. The Massachusetts Society for the Suppression of Intemperance and kindred vices, was presided over by the Hon. Samuel Dexter, ex-Secretary of War and Treasurer, who devoted much effort to securing statistics, and the society spread them widely by the printed page, by sermons, lectures and mass meetings. The use of liquors was then almost universal and total abstinence was a mark of singularity or eccentric nature. Drinks were supplied at all ceremonial occasions, marriages, christenings, conferences, funerals and all social functions. It was served to

clergymen in pastoral visits and often several calls in one afternoon put him out of service for evening. It was against such customs the 'moderation society' struggled in vain. But it did great service to the cause by the statistics gathered for future use under a more vigorous régime. Dr. Lyman Beecher came again to the front with *Six Sermons on Intemperance* (1825) in which he demanded the banishment of ardent spirits from the list of lawful articles of commerce. Another Society for the Promotion of Temperance was organized in Boston 1826, Feb. 13, with Hon. Marcus Morton as president. Within two years 222 societies were organized in 17 different states. In 1836 the movement had grown to 7,000 societies, of 1,250,000 members.

A similar work was going forward in Belfast, Ireland, promoted by Prof. Jno. Edgar; and in Glasgow, Scotland, by Jno. Dunlop, 1829; in Bradford, Eng., 1830, by Henry Forbes; also in Stockholm, Sweden, and in Norway; also in Berlin, Germany, 1837. The impulse was permanent in all these countries and took much the same course, as in U. S., leading finally to total abstinence. A remarkable work was started at Leeds, Eng. 1847, Oct., by Mrs. Carlisle, of Dublin. She organized the children and named the society The Band of Hope. This spread rapidly and in two years 15,000 children had been enrolled, and in 1864 1,000,000 members were reported.

A national convention was held in Philadelphia 1833, which resulted in the formation of a union for the promotion of abstinence from distilled liquors; as far as it was deemed advisable to carry the war, at that time. But it was rapidly becoming apparent that danger lurked in liquors not distilled, as well. Another convention at Saratoga Springs, 1836, took the other step in favor of 'total abstinence from all intoxicating drinks,' this being fully understood to include wine, beer, ale, and cider. And now the total abstinence movement was thoroughly inaugurated in the U. S. And the same movement in Ireland under the leadership of Father Matthew, not to the entire exclusion of the other societies, as the Church of Eng. Temp. Society, and the Wesleyan Temp. Society, both operating in England on the dual basis, or 'use-temperately' principle.

Methods.—Until the Washington period, 1842-3, the work of the societies was chiefly limited to efforts to prevent drunkenness by educating people in the 'temperate use' of alcoholics. But the vice continued to increase. The Washingtonian crusade took up a new watch-cry, for the reclamation of drunkards. It was organized in Baltimore by six men who had constituted a 'Tipler's Club,' which they reorganized into a Washingtonian society with a total abstinence pledge and the spirit of a vigorous campaign for reclamation of drunkards through a public service of pledge signing. In this

method they followed the lead of Micajah Pendleton of Virginia, who in 1800 drew up a pledge of total abstinence for his own protection, and induced many others to sign with him. The result was so beneficent, moralizing and ennobling that it offered high inducement to the six tiplers to conduct a similar, and more extensive campaign. Their weird stories of actual experience and observation, delivered in humble, illiterate, but really powerful manner was effective in awakening general interest to the very foundations of society. It was estimated in round numbers that 600,000 men who had been addicted to their cups signed the pledge of abstinence in this stirring movement, and very many kept the pledge through life. President James K. Polk discussing the statistics of the work said that two-thirds of the entire population of the U. S. had been pledged to abstinence.

But without organic boundaries, or legal restrictions, or social obligations, apart from the mere count of pledges kept by secretaries of meetings in each community, the demands of a mixed population would soon counterbalance the great uprising. The moral pendulum swung back under political agitation for territorial accession, till the old drink customs again dominated.

Then came a wave of social and religious effort in the restrictive measures in church and canon law, requiring ministers and members to abstain from drinks and to promote the cause of abstinence. Especially were business members restrained from leasing property to dealers in alcoholics and from signing applications for licenses to sell drinks. But it was soon conceded, and is still a fact that the church at large is necessarily conservative and cannot be a progressive temperance organization, because always divided on the main subject, and also on the methods of temperance propaganda. Hence, other social efforts became an open demand for the devotees of the cause. Among these was the organization of various secret orders which conducted less public campaigns for the reclamation and social help of drinking men, and for the education of members in all the principles involved in the propagation of the general cause—a sort of private school for workers. These instructions were greatly needed, and the institutions became highly successful and educative to a degree not usually accredited. Early among these was the Sons of Temperance, for whom John B. Gough was orator.

Good Templars.—The International Order of Good Templars is the greatest of these orders, the largest temperance organization in the world, being world-wide in domain and having initiated over 7,000,000 members, and more than 700,000 juveniles in a junior order. It was organized in Utica, N. Y., 1851. It was the first of any kind of society to admit women on equal basis with men, and made them eligible to any office within

the gift of the order. This proceeding was so novel that the institution attracted wide attention and opposition; nevertheless it won great victories of reclamation and popular education which blazed its pathway with unusual intelligence for work among its members. While essentially a religious organization, holding more than 20,000 meetings every week, where hymns and prayers are used, it has no religious test save the personal belief in a Supreme Being. The ritual has been translated into 14 different languages and the work instituted in all the United States, and most of the world. The war ships of Great Britain nearly all have a lodge of Good Templars among the officers and crews. The Good Templar platform of principles was far in advance of anything declared at that early date; it requires: (1) Total abstinence by perpetual obligation; (2) no license in any form or under any circumstances; (3) absolute prohibition in due form of law for state and nation; (4) creation of healthy public opinion by disseminating truth through all modes of enlightened philanthropy; (5) the election of good men to administer laws; (6) persistent efforts to save individuals and communities from the direful scourge.

N. W. C. T. U.—National Woman's Christian Temperance Union was a gathering up of the fragmentary forces into a body of possible power after the spending and consuming seismic action, or labor of the Woman's Crusade in Ohio, which had sent some vibrations into neighboring states. The novel movement in Ohio started in an already prepared state of sentiment, from the suggestion of Dr. Dio Lewis, of Boston, made in lectures through several states in the winter of 1873-4. Under date of 1874, Feb. 2, Dr. Dio Lewis wrote to Mrs. M. V. Ustick, of Washington, sec. of the league: 'I had explained the scheme to more than 20 audiences. It remained for you to embody the thought in glorious achievement. . . . . Never shall I forget that at Washington C. H., Ohio, one of my long cherished dreams escaped from the region of imagination into grand and glorious realism. To your town belongs the honor of this splendid achievement.' And in another letter he speaks of Washington as 'the vital historic centre of the greatest Pentecost of modern times.' The *Appeal for Action* was written by Mrs. M. G. Carpenter, of Washington, and was used generally throughout the state. In eight days every saloon in the town was closed.

'Mother Stewart' (Mrs. E. D.), of Springfield, possessed qualities which made her a natural leader in the work; with experience in the Christian commission of the civil war, and skill in Good Templary work she soon came to the front after that first convention in Columbus, where her initial talk was very happy. Her *Memories of the Crusade* are reliable history; as also Mrs. Carpenter's *Crusade at Washington.*

This flood tide of public sentiment washed out the saloons of nearly 300 towns of the state of Ohio before the middle of April. During this time the state chief of Templars, Mrs. McClellan Brown, organized 103 leagues, afterward called unions, and the while was formulating a 'plan' to conserve the interest of this multitude of women for the general cause, and an *Address to the Women of the World*, which should stir, if possible, their kinship of purpose for the final abolition of the drink business. The first Chautauqua assembly, 1874, Aug., was utilized to make known her plans, the result being the announcement of a *plan of work:* Organization; the sun-glass brings to focus scattered rays of light. Provided for a meeting in each congressional dist. to elect a del. to nat. con., and by this plan the first meeting at Cleveland was composed of 72 delegates from as many dists. in 16 different states; making sentiment; evolution in this order; people are informed, convinced, convicted, pledged; (*a*) circulate literature; (*b*) teach children in Sabbath-schools, public schools, the ethics, chemistry, physiology and hygiene of total abstinence; (*c*) give prizes for best essays on subject in all kinds of schools; (*d*) illustrate by pictures; (*e*) organize glee clubs, sing doctrines into dull hearts; (*f*) seek columns to edit in newspapers; (*g*) secure pastors to preach, hold special services and introduce work in Sunday-school at least once in three months; juvenile societies; pledge people; sacramental wine; urge the use of unfermented; instruct in Bible wines; anti-treat leagues; men who will not sign for abstinence may refrain from treating; coffee rooms; neat places for service of a curative drink for reformed men; bureau of information; counter-attractions; (*a*) make home most attractive; (*b*) reading circles; (*c*) æsthetic exercises; (*d*) pleasing amusements; (*e*) social and literary contests; gospel meetings, in churches, halls, billiard rooms, railroad foyers, hotels, everywhere; fountains; erect them wherever possible, in villages, towns, cities; money, the sinews of war, peaceful or profane; all should pay one cent per week; trysting with God, dedicate twilight to prayerful thoughts; noonday to secret prayer; conclusion, an appeal for the plan of the long campaign in expectation of the day 'when all men's weal shall be each man's care, and there shall be nothing to destroy in all our beloved land, set at liberty from the foe.'

Mrs. Anne Wittenmeyer, of Philadelphia, was first president, Miss Frances Willard, corresponding secretary; Mrs. Ingham, of Cleveland, treasurer. Each department was placed under jurisdiction of a competent chairman, to be worked like an organization of itself, and according to skill of chairman, elaborated specific service, calling varied talents into every phase of reform work, including the publication of a paper to represent the varied interests, *The Union Signal.*

The first annual convention at Cincinnati, O., may be said to have fixed the foundations firmly; the same officers were re-elected; 22 states were represented. Ohio, as might be expected, leading, with more money than double all the other states. The following resolution, offered by Mrs. Zeralda Wallace, of Indianapolis, was adopted:

'Whereas, the object of just government is to conserve the best interests of the governed; and whereas, the liquor traffic is not only a crime against God but subversive of every interest of society; therefore in behalf of humanity, we call for such legislation as shall secure this end; and while we will continue to employ all moral agencies as indispensable, we hold Prohibition to be essential to the full triumph of this reform.'

Only those familiar with their absolute dependence on crusade methods can conceive of the growth of principle in those women who had worked just one year, as the adoption of this resolution represents. And steady growth characterized the entire movement thenceforward until all the states, territories and provinces of North America were organized, and under the masterly ability of Frances Willard, who became president 1877, the work was successfully launched in Europe, with Mrs. Margaret Bright Lucas, as president, and furthered by the wise co-operation of Lady Henry Somerset, who became president of the World's Union in 1893; 35 countries are now legally represented in the world's organization, with 1,000,000 of women taking hands round the world, girded by a white ribbon, the embelem of their work.

The bibliography is vast; a few authors may be named: Dr. Lees, *Temperance History;* Burns, *Temperance Essays by Numerous Authors; Cyclopedia of Temperance and Prohibition; Liquor Problem in All Ages;* Dorchester, *One Hundred Years of Temperance;* Hastings, *Foundation of Death;* Gustafson, *Centennial Temperance Volume;* Blair, *Temperance Movement;* and many others.

TEMPERANCE UNION, WOMEN'S CHRISTIAN. See WOMEN'S CHRISTIAN TEMPERANCE UNION.

TEMPERATE, a. *tĕm'pĕr-āt* [L. *temperātus,* pp. of *temperārĕ,* to mingle in due proportion, to qualify (see TEMPER)]: moderate; not excessive; habitually moderate in the indulgence of the appetites and passions; sober; moderate or intermediate; measured; calm; free from passion or undue excitement. TEM'PERATELY, ad. *-lĭ,* moderately; not in excess. TEM'PERATENESS, n. *-nĕs,* moderation; freedom from excess; calmness. TEM'PERATURE, n. *-ă-tūr* [F. *température*—L.]: degree of heat or cold; any degree of sensible heat as measured by the thermometer (specifically, see TERRESTRIAL TEMPERATURE); in *OE.,* moderation. MEAN TEMPERATURE, the mean of all the temperatures observed at any place at regular intervals during a certain time. TEMPERATE ZONES, two parts of the earth n. and s. of the equator,

within which the sun never appears vertical—the *north* temperate zone lying between the Arctic circle and the tropic of Cancer, and the *south* between the Antarctic circle and the tropic of Capricorn.—SYN. of 'temperate' abstinent; abstemious; sober; moderate; calm, sedate; self restrained; cool.

TEM'PERATURE OF THE BODY: important indication in medical practice. Though the range of temperature varies in different parts of the human body, the normal temperature at completely sheltered parts of the surface amounts to 98°.4, or a few tenths more or less, and if there is persistent elevation above 99°.5, or depression below 97°.3, some form of disease is certainly indicated. (In warm-blooded animals, generally, the temperature is one degree lower at completely sheltered parts of the surface than in the back of the mouth, or other accessible internal parts.)

For some of the circumstances which cause a deviation from the normal temperature, see ANIMAL HEAT. It is further to be noted that exposure to cold without exercise, and sustained mental exertion, reduce the temperature: and that the amount of heat is at first reduced after a full meal, though it subsequently rises.

When the temperature rises in disease, the following relation of its augmentation to that of the pulse is usual: an increase of 1° above 98° corresponds with an increase of ten beats of the pulse in a minute. Thus, if the pulse is 60 at 98°, it is 70 at 99°, 80 at 100°, and so on.

A few of the more important indications furnished by a rise in temperature are here given in condensed form. In *malarial fever*, the temperature begins to rise several hours before the beginning of the paroxysm, and after the disease *seems* to have disappeared, a periodic increase of the temperature may still be detected; and as long as this continues, the patient is not really cured. In *typhoid fever*, the rise of temperature, or its abnormal fall, may indicate what is about to happen before any change in the pulse or other sign of mischief has been observed. A sudden fall of temperature thus denotes intestinal hemorrhage. When a person, healthy on the previous day, exhibits in the morning a temperature above 104°, it is almost certain that an attack of malaria is coming on, if a person is in a region where this disease prevails. If, during the first day of illness, the temperature rises to 106°, it is certain that the patient has not typhus or typhoid fever. In typhoid fever, a temperature not exceeding on any evening 103°.5, indicates a probably mild course of fever. A temperature of 105° in the evening, or 104° in the morning, shows a severe attack, and forebodes danger during the third week. On the other hand, a temperature of 101°.7, and below, in the morning, indicates a very mild attack, or the beginning of convalescence. In pneumonia a temperate of 104° and upward indicates a severe attack. In acute rheuma-

tism, a temperature of 104° is always an alarming symptom. In a case of jaundice otherwise mild, an increase of temperature indicates a pernicious turn. In tuberculosis an increase shows advance of the disease, with untoward complications. In short, a fever temperature of 104° to 105° in any disease indicates that its progress is not checked, and that complications may still occur. Persistent elevation of temperature exists as an invariable precursor of the growth of tubercle in any organ. As a general rule, when the temperature rises continuously to 106°.2, the prognosis is unfavorable; and when it rises to 110°, a fatal issue is almost certain. The diseases in which the highest temperatures have been observed are scarlatina, in which it has been noted at 112°; and tetanus, in which, at the period of death, it was 112°.5, and an hour afterward 113°.8.

TEMPERING: the art of imparting to metals, by means of heat treatment, a definite degree of hardness. The term is now applied almost exclusively to certain kinds of steel, which are used in the manufacture of tools. It is said that the ancients could harden and temper copper; but this art, if it ever really existed, is now lost. The effects of thermal changes upon steel vary greatly with the quality of the steel, and with the exact nature of the treatment. It is necessary to distinguish clearly between 'annealing,' 'hardening,' and 'tempering.' Any steel may be annealed, but it is essential that the steel shall contain a certain amount of carbon, in order that it may be capable of being hardened and tempered. If steel is raised to a red heat and is then allowed to cool very slowly, it becomes relatively soft, so that it can be filed and turned in a lathe. This process is called 'annealing,' and it has usually been held that the slowness of the cooling is the essential thing in the softening process. There is excellent reason for believing, however, that the exact temperature to which the steel is exposed before it is cooled has a much greater influence than the rapidity of the cooling. It has been shown, for example, by the researches of Brinell, Tschernoff, Le Chatelier, Heyn, Ridsdale, Stead, and others, that steel which has acquired a dangerous crystalline character from annealing for a long time at too low a temperature in a slightly oxidizing atmosphere, or from long continued heating at high temperatures, may have its original structure and properties restored by the simple artifice of heating it to a certain critical temperature (which is about 1600° F.), and then allowing it to cool; the rate of cooling, in this case, being a matter of comparative unimportance. Steels may sometimes be had which do not need special treatment to render them fit for use in certain classes of tools; the tool being ready for use after it has been forged and allowed to cool by natural exposure to the air. In general, however, a tool steel must receive special treat-

ment in order to fit it for the work in hand; this treatment being given after the tool has been forged to shape. The process of tempering then consists of two steps, the first of which consists in imparting to the cutting edge of the tool a degree of hardness that is too great for the work for which the tool is to be used, while the second step consists in reducing (or 'tempering') this hardness, until it attains a value that experience has shown to be satisfactory. The tempering of an ordinary tool may be described as follows: The finished tool is heated to a bright red, care being taken to have the heat extend back to some distance from the cutting edge. The cutting edge of the tool is then immersed in water to a slight depth, and kept there until it has cooled sufficiently to remain wet when withdrawn from the water. By this means the steel is rendered exceedingly hard throughout the chilled part; that is, in the vicinity of the cutting edge. If it were used in this condition, however, the edge would be too brittle, and would be likely to break in service. To reduce the hardness to the proper value, the tool, immediately after being withdrawn from the water, is brightened up near the cutting edge with a piece of emery cloth, or in some similar manner, and the cleaned area is then watched while the heat from the unquenched part spreads toward the cutting edge. The article to be tempered is then wetted with sperm oil, and gradually and uniformly heated until the oil upon it blazes up, when the piece is again quenched in the oil. This process of heating to the ignition point of the oil and then quenching is repeated until it has been performed three times, after which the piece is said to be 'oil tempered,' and is ready for use.

In the early days of steel-working in the United States, it was common to import water in casks from Sheffield, England, for hardening and tempering purposes, as it was believed that there is some special virtue in the water that had been used for so long, and with such eminent success, in that city. There was probably little or no foundation for this belief, and yet it is known that substances that may be in solution in the water that is used for quenching often have an important influence upon the product. Many artisans dissolve salt or cyanide of potassium in the water that they use for this purpose, and there is considerable ground for the belief that such dissolved substances do exert an influence upon the character of the product, which is out of all apparent proportion to the strength of the solutions containing them. In particular, it may be noted that there is a deeply-rooted belief among blacksmiths and other artisans who work with metals, that a piece of steel cannot be hardened by heating it and then quenching it in water that contains soap, even in small amounts.

TEMPEST, n. *tĕm'pĕst* [OF. *tempeste;* F. *tempête,* a tempest—from L. *tempes'tas,* weather, a storm—from

tempus, time: It. *tempesta*]: wind rushing with great velocity and violence, with or without rain, hail, or snow; a storm of extreme violence; any violent agitation or commotion, as of passion or party-war; tumult; perturbation; V. in *OE.,* to disturb greatly or violently, as by a tempest; to storm. TEM'PESTING, imp. TEM'PESTED, pp. TEMPESTUOUS, a. *tĕm-pĕst'ū-ŭs,* very stormy; turbulent. TEMPEST'UOUSLY, *ad. -lĭ.* TEMPEST'UOUSNESS, n. *-nĕs,* the state or quality of being tempestuous. TEMPEST-BEATEN, a. exposed to the full violence of the tempest. TEMPEST-TOST, or TEMPEST-TOSSED, driven about by storm.—SYN. of 'tempest, n.': storm; hurricane; tornado; cyclone, agitation; perturbation.

TEMPLAR, n. *tĕm'plĕr:* one of a military order of religious persons established in the 12th c. in modern usage, a student of law of the *Temple* in London.

TEMPLARS, *tĕm'plĕrz,* KNIGHTS: a religious and military order, founded at Jerusalem in the beginning of the 12th c., by Hugues de Paganes, Geoffroy de St. Omer, and seven other French knights, for the protection of the Holy Sepulchre, and of pilgrims resorting thither. Baldwin II., King of Jerusalem, bestowed on this order their first place of residence; and an additional building was acquired from the abbot and canons of the church and convent of the Temple, whence the order obtained the name 'Poor Soldiers of the Temple of Solomon,' afterward abbreviated into Templars. The knights were bound by their rule to hear the holy office every day, or if prevented by their military duties, to say a certain number of paternosters instead; they were to abstain from flesh four days in the week, and from eggs and milk on Fridays. They might have three horses and an esquire each, but were forbidden to hunt or fowl. In their earlier history, the Templars made a great show of poverty, contrasting much with their later condition. After the conquest of Jerusalem by the Saracens, they spread over Europe; their valor became everywhere celebrated; immense donations in money and land were showered on them; and members of the most distinguished families thought themselves honored by enrolment in the order. In every country where they existed, they had their governor, called the Master of the Temple or of the Militia of the Temple. The Templars had settlements in England from an early period. The first was in London, on the site of Southampton Buildings, Holborn; but from 1185 their principal seat was in Fleet Street, still known as the Temple, but now occupied by lawyers, and owned by the two Inns of Court. The round church in London, which bears their name, was dedicated by Heraclius, Patriarch of the Church of the Resurrection in Jerusalem, 1185, and the chancel was consecrated 1240.

The Templars were all at first laymen and of noble

birth. Pope Alexander III., however, 1162, authorized the admission of spiritual persons not bound by previous vows, as chaplains to the order, who were not required to adopt the military vows. A third class was afterward introduced, consisting of laymen not of noble birth, who entered as serving brothers, some being attendants on the knights, others exercising trades in the houses or lands of the order. Eventually many persons became affiliated members without taking the vows, for the protection afforded them. As the power and prosperity of the Templars increased, so did their luxury and arrogance; which gave the French kings a pretext for suppressing them, and seizing their possessions. Accusations, most of which were utterly absurd and incredible, were brought against them by two members of their own body. Their principal enemy was Philippe IV. of France, who induced Pope Clement V. to accede to a scheme by which the chief members of the order were seized and imprisoned, their lands confiscated, and many of them tried and summarily put to death, on charges for which there was no evidence beyond the confessions of a few, wrung from them by the severest tortures. The English Templars were arrested by command of Edward II.; and a council in London, 1309, having convicted them of various crimes, most of which were probably imaginary, the king seized their possessions. In 1312 the whole order throughout Europe was suppressed by the Council of Vienne, and its property bestowed on the Knights of St. John, to whom their English possessions were formally transferred 1323.

The habit of the Templars was white, with a red cross of eight points of the Maltese form worn on the left shoulder. Their war-cry was 'Beau séant;' and their banner, which bore the same name, was parted per fess sable and argent. They also displayed above their lances a white banner charged with the cross of the order. Their badges were the *Agnus Dei*, and a representation of two knights mounted on one horse.—See Addison's *History of the Knights Templars, the Temple Church, and the Temple* (Lond. 1842); A. O. Haye's *Persecution of the Knights Templars* (Edin. 1865).

TEMPLATE, n. *tĕm'plāt*, or TEM'PLET, n. *-plĕt* [L. *templum*, a piece of timber, a purline lying horizontally on the rafters—from Gr. *temnō*, I cut]: pattern used by masons and bricklayers as a guide for the formation of ornamental portions of their work, and generally consisting of sections of moldings, etc., cut in thin board; pattern used by machinists, mill-wrights, etc., for shaping the teeth of wheels and other parts; short pieces of timber under a beam or girder to distribute the pressure.

TEMPLE, n. *tĕm'pl* [F. *temple*—from L. *templum*, a portion cut off, an open sacred place, a temple; allied to Gr. *temĕnos*, a sacred inclosure—from *temnō*, I cut]: a building appropriated to religious rites and worship; a

church. THE TEMPLE, in *London*, a district comprising buildings—formerly the property of the Knights Templars—occupied by lawyers, the joint property of the two Inns of Court called the Societies of the Inner Temple and Middle Temple, each of which has a right of calling persons to the degree of barrister—a privilege shared by the other Inns of Court, Gray's Inn (q.v.), and Lincoln's Inn (q.v.). See TEMPLARS, KNIGHTS; INNS OF COURT.

TEMPLE: a name applied in religious history particularly to the temple built by Solomon at Jerusalem as a House of the Lord, and to the temples which succeeded it, more especially the magnificent structure, erected by Herod the Great, which is often mentioned in the New Testament. Solomon's Temple was built with the aid of an architect and skilled workmen from Phœnicia. The temple was an oblong stone building, 60 cubits in length, 20 in width, and 30 in height. On three sides were corridors, rising above each other to the height of three stories, and containing rooms in which were preserved the holy utensils and treasures. The fourth or front side was open, and was ornamented with a portico, 10 cubits in width, supported by two brazen pillars, Jachin and Boaz (stability and strength). The interior was divided into the most holy place or oracle, 20 cubits long, which contained the ark of the covenant, and was separated by a curtain or veil from the sanctuary or holy place, in which were the golden candlesticks, the table of the shew-bread, and the altar of incense. The walls of both apartments and the roof and ceiling of the most holy place were overlaid with wood work, skillfully carved. None but the high-priest was permitted to enter the latter, and only the priests devoted to the temple service the former. The temple was surrounded by an inner court, which contained the altar of burnt-offering, the brazen sea and lavers, and such instruments and utensils as were used in the sacrifices, which, as well as the prayers, were offered here. Colonnades, with brazen gates, separated this court of the priests from the outer court, which was likewise surrounded by a wall. This temple was destroyed by the Assyrians, and after the return from the Babylonish captivity a second temple of the same form, but much inferior in splendor, was erected. Herod the Great rebuilt it of a larger size, surrounding it with four courts, rising above each other like terraces. The lower court was 500 cubits square, on three sides surrounded by a double, and on the fourth by a triple row of columns, and was called the court of the Gentiles, because individuals of all nations were admitted into it indiscriminately. A high wall separated the court of the women, 135 cubits square, in which the Jewish females assembled to perform their devotions, from the court of the Gentiles. From the court of the women 15 steps led to the court of the temple, which was inclosed

by a colonnade, and divided by trellis-work into the court of the Jewish men and the court of the priests. In the middle of this inclosure stood the temple, of white marble richly gilt, 100 cubits long and wide, and 60 cubits high, with a porch 100 cubits wide, and three galleries like the first temple, which it resembled in the interior, except that the most holy place was empty, and the height of Herod's temple was double the height of Solomon's. Rooms appropriated for different purposes filled the upper story above the roof of the inner temple. This edifice was destroyed by the Romans in 70 A.D., and for many centuries the long-consecrated height has been occupied by the Mosque of Omar.

The Egyptians, Greeks, Romans, Persians, and other ancinent nations, had temples for the worship of their gods, and the Mexicans and Peruvians, at the time of the arrival of the Spaniards in the New World, had splendid temples. On the sacrificial platforms of Aztec temples thousands of victims perished annually. The Greek and Roman temples were, as a rule, models of architectural grandeur and beauty. The word 'temple' is sometimes, but not often, applied to Christian places of worship as a special designation, though frequently used in a figurative sense. The Mormons designate as 'The Temple' the large structure in which they worship at Salt Lake City.

TEMPLE, THE: London, England, a district of the city lying between Fleet Street and the Thames, and divided by Middle Temple Lane into the Inner and the Middle Temple, belonging to separate societies, each with its hall, library, and gardens. The name is derived from the Knights Templars, who had their headquarters in England here. The two temples are separated by a wall from the rest of the city, and have entrance gates which are closed at night. The district is occupied by barristers and solicitors.

TEMPLE, n. *tĕm'pl*, usually in the plu. TEM'PLES, *-plz* [OF. *temple;* F. *tempe;* It. *tempia,* the temple of the head—from L. *tempŏra,* the temples of the head]: the upper part of the sides of the head. TEM'PORAL, a. *-pō-răl,* belonging to the temples. TEMPORAL BONES: see SKULL.

TEMPLE, *tĕm'pl:* city in Bell co., Tex.; on the Gulf, Colorado and Santa Fé and the Missouri, Kansas and Texas railroads; 36 m. s.-by-w. of Waco, 218 m. n.w. of Galveston. It was founded in 1882 by the Gulf, Colorado and Santa Fé Railroad, and was chartered as a city the same year. It has an agricultural and stock-raising region and has considerable manufacturing interests. The chief manufacturing establishments are agricultural-implement works, cottonseed-oil mills, and cotton compresses. The government census of 1900 gives the amount of manufacturing establishments, 74; the amount of capital invested, $700,369; the number of employees in the manufacturing establishments, 328; the annual amount of wages, $158,882; the cost of material, $569,580; and

the value of the products, $908,726. There are eight churches, public and parish schools, Saint Mary's Academy, two kindergartens, a business college, and a public library. The three banks have a combined capital of $280,000. Pop. (1900) 7,065; (1910) 10,993.

TEM'PLE, FREDERICK, D.D.: archbishop of Canterbury, Eng.: b. Santa Maura, 1821, Nov. 30; d. 1902, Dec. 23. He was graduated B.A. at Oxford 1842, taking high rank, after which he was fellow and mathematics tutor in his college, Balliol. In 1846 he was ordained deacon; and was principal of Kneller Hall Training School 1848-55, inspector of schools 1855-58, head master of Rugby School 1858-69, and queen's chaplain. His contribution (*The Education of the World*) to the famous volume *Essays and Reviews* occasioned unavailing opposition to his consecration as bishop of Exeter, to which he was nominated by Gladstone 1869. In 1885 he was appointed bishop of London. He was author of three published series of Rugby sermons 1859-69, and *Relations between Religion and Science* (Bampton Lectures 1884). On the death of Archbishop Benson, 1896, Oct. 11, Lord Salisbury selected Temple as his successor as archbishop of Canterbury; Temple being then nearly 75 years of age, but a man of unlimited willingness to work, with a genius for business details, and with a wonderful record as an organizer and administrator. He was a liberal in politics and in former years a broad churchman.

TEM'PLE, RICHARD GRENVILLE, Earl: 1711, Sep. 26—1779, Sep. 11; b. England: brother of George Grenville. He was elected to parliament 1734; succeeded to the earldom 1752; was lord of the admiralty 1756-7, lord privy seal 1757-61; and was made knight of the Garter 1760. William Pitt married his sister Hester, and the correspondence of the Grenville brothers with that statesman was published under the title of *The Grenville Papers*, 4 vols. (1852-3).

TEMPLE, OLIVER PERRY: American lawyer and author: b. Green county, Tenn., 1820, Jan. 27. He was graduated from Washington College, Tenn., in 1844, and admitted to the bar in 1846. He was a Union leader in East Tennessee during the Civil War; was a chancellor of Tennessee, 1866-78, and retired from the bar in 1881. His publications include *The Covenanter, The Cavalier and the Puritan* (1897); *Union Leaders of East Tennessee* (1903); etc.

TEMPLE, RICHARD CARNAC: English civil servant and antiquary: b. Allahabad, India, 1850, Oct. 15. He was educated at Cambridge University. He served in the Burma war 1887-9 and received a medal for bravery. From 1887-93 he was engaged by the Indian government to raise and fit out volunteer regiments. He has published *Wide Awake Stories* (1884); *Legends of the Punjab* (1883-90); etc., and is a member of philological and other learned societies.

TEMPLE, Sir WILLIAM: English diplomatist and writer: 1628–1699, Jan. 27; b. London; eldest son of Sir John T., master of the rolls in Ireland. He studied two years at Emmanuel College, Cambridge, and at the age of 19 travelled abroad. He acquired the French and Spanish languages. He entered on public life 1661 as member for the county of Carlow, in the Irish parliament. In 1665, he was sent to Westphalia, on a secret mission; and on his return was created a baronet, and appointed resident at the court of Brussels. The chief aim of this accomplished statesman was to enjoy lettered ease and leisure, apart from public responsibility. He was naturally, however, a good negotiator. His most important diplomatic success was the famous treaty of 1668, known as the Triple Alliance, by which England, Holland, and Sweden bound themselves to unite in curbing the ambition of France. He was long ambassador at the Hague, and assisted in bringing about the marriage of the Prince of Orange with the Princess Mary. Charles II. in vain urged him to accept the appointment of sec. of state. When the revolution placed William III. on the throne, T. was again solicited to become sec. of state; but he again refused. During the remaining ten years of his life, mostly at his favorite seat of Moor Park, in Surrey, he had, as secretary and humble companion, Jonathan Swift (q.v.), who regarded his stately, studious, and self-complacent patron with more fear than affection, but who ultimately became his literary executor. T.'s collected works form four vols. (Lond. 1814).

As an author, T. is now known chiefly by his historical *Memoirs* and his *Miscellanea*, the latter a collection of essays on various subjects. He has been considered one of the reformers of English style, 'the first writer,' says Johnson, 'who gave cadence to English prose.' His style has quite a modern air, and is smooth, copious, and agreeable. He is too pretentious as respects scholarship and learning, and has no weight as a political writer; but he expatiates pleasantly on foreign travel and country life, on flowers and fruits, on parterres, terrace-walks, and fountains.—As a public servant T. was impartial, honest, unambitious, and in his foreign policy admirable.

TEMPLEMORE, *tĕm-pl-mōr'*: market-town of the county of Tipperary, province of Munster, Ireland; supposed to take its name from a commandery of the Knights Templars; 79 m. from Dublin on the right bank of the river Suir, 9 m. n. of Thurles. Pop. about 2,800.

TEMPLETT, *tĕm'plĕt*: see TEMPLATE.

TEMPLIN-OIL, n. *tĕm'plĭn-* [etym. doubt.]: in *chem.*, oil of pine-cones; obtained by distilling the cones of the silver-fir or of *Pinus pumilis.*

TEMPO, ad. *tĕm'pō* [It. *tempo*—from L. *tempus,* time]: in *music,* time; the relative degree or rapidity of movement. The rhythmical proportions of notes, as indicated by their form, give them only a relative value, and have no reference to the absolute speed with which the composition should be played. Some compositions require a lively movement; others a slower movement. Of the different terms used to indicate different gradations of movement, the principal, beginning with the slowest, are: *Largo,* broad; *larghetto,* somewhat broad; *lento,* dragging; *grave,* heavy, solemn; *adagio,* slow; *andantino,* moving a little; *andante,* moving; *allegretto,* somewhat lively; *moderato,* moderately quick; *allegro,* lively; *vivace,* with vivacity; *presto,* rapidly; *prestissimo,* with great rapidity. These terms are not always used with precision, and sometimes apply more to the character than to the absolute speed of performance. They are often modified by other qualifying words, as *allegro con brio,* lively and with briskness; *allegro appassionnato,* passionately excited. The *tempo* is indicated with more exactness by a reference to the beat of the Metronome (q.v.). Thus M.M. = 120, signifies that 120 beats of the metronome, each representing a crotchet, are to fill up the space of a minute; M.M. = 60, that 60 quavers are to be performed in a minute.

While the general rule is that the time of a movement is to be steady and unvarying, cases often occur where a certain part of a composition is to have a movement quicker or slower than the rest, this is indicated by such terms as *più vivo,* more lively; or *ritenuto,* kept back; while a return to the original time is expressed by the words *a tempo.* The performer may be required to proceed from one degree of movement to another, not abruptly, but gradually; the terms used to express this are: *rilasciando,* slackening; *ritardando,* retarding; *calando,* calming down; *stringendo,* pressing on; *accelerando,* gradually increasing speed; with some others.

TEMPO RUBATO (stolen time) denotes a mode in which a restless character is imparted by protracting one note beyond its proper duration, and curtailing another, so that the aggregate duration of each measure remains unchanged.

TEMPORAL, a. *tĕm'pō-răl* [L. *tempŏrālis,* lasting but for a time—from *tempus,* time: It. *temporale:* F. *temporel*]: pertaining to time; expressing a time relation; pertaining to this life or world, or to the body only; worldly; secular; not eternal; transitory; measured or limited by time or by this life. TEM'PORALLY, ad. *-lĭ.* TEM'PORAL'ITY, n. *-răl'ĭ-tĭ,* a secular possession. TEM'PORAL'ITIES, n. plu. *-tĭz, especially,* revenues of a clergyman arising from lands, tithes, etc.; also TEM'PORALS. TEMPORAL LORDS, the lay hereditary peerage.

TEMPORAL, a. *tĕm'pō-răl:* see under TEMPLE 2.

TEM'PORAL POWER OF THE PAPACY: phrase susceptible of two very distinct meanings, the confusion of which has led to serious misunderstanding.

I. In one sense, it means the sovereign power which the pope possessed as ruler of the Papal States, in late years the subject of much controversy. The power which the pope exercised within his own states, though modified in its exercise by his spiritual character, was in substance the same as that of any absolute sovereign: for the history, see PAPAL STATES. Many of the mediæval sectaries asserted the incompatibility of the spiritual with the temporal power in the same person, whether the pope or a baron-bishop. This was the doctrine of Vaudois; of Pierre de Bruis; and, above all, of Arnold of Brescia, whose sentence to death was the penalty of rebellion rather than of heresy. Through the centuries which followed, the anti-papal controversies turned almost entirely on doctrine; and this question did not enter even into the conflict of Gallican and Ultramontane principles. The great Gallican champion Bossuet maintained that the pope's temporal sovereignty was in some sense necessary to the free exercise of his spiritual power. It was not until the aggression of the French republic upon Rome, and the annexation of the papal provinces called the Legations to the Cisalpine republic, and afterward to the kingdom of Italy, by Bonaparte, that the controversy on the temporal sovereignty assumed practical interest. During the later conflict between Pius VII. and Napoleon I., the emperor's design of a still further annexation of papal territory was one of the main causes of dispute; and more recently, after the reannexation of nearly the same portions of the Papal States to the kingdom of Italy, the question again agitated the entire Rom. Catholic world. No formal and authoritative judgment of the Roman Church was pronounced regarding it; but a strong and almost unanimous expression of opinion was tendered to Pope Pious IX., in the form of letters and addresses from bishops and others in every part of Rom. Catholic Christendom, whose tenor is nearly the same. They profess that the possession of temporal sovereignty is no essential part of the privileges of the successor of St. Peter; but they also regard the possession of a sovereignty independent of any particular sovereign as the means providentially established for protection of the spiritual independence of the pope, and of the free exercise of his functions as spiritual ruler of the church. The contrary opinion, held by some distinguished members of the Roman Church, though regarded with great disfavor, was not formally condemned by a doctrinal decision, nor was any action taken on it in the Vatican Council. The more recent annexation of the city of Rome itself to the kingdom of Italy elicited a still stronger expression.

II. By the second signification of the phrase 'Temporal Power of the Papacy' is understood what would be called

more properly the claim of the pope, in virtue of his office, to a power over the temporalities of other kings and states.

This power may be of two kinds, *directive* and *coercive*. In the first sense, it is a claim which no Rom. Catholic, consistently with his belief of the spiritual supremacy of the pontiff, can be supposed to deny, as it imports nothing more than that the pope, as supreme moral teacher, has power to instruct all members of his church, whether subjects or sovereigns, in the moral duties of their several states.

If the power be regarded as coercive, it is necessary to distinguish the nature of the coercion which may be employed. That coercion may either consist in the threat or infliction of *purely spiritual censures*, or it may involve temporal consequences, such as suspension or deprivation of office, forfeiture of the allegiance of subjects, and even liability to the punishment of death. Considered in the former sense, the claim must be regarded as a natural consequence of the spiritual headship of the church, which is acknowledged by all Rom. Catholics; nor can it be denied that the power to compel sovereigns, by purely spiritual censures, to the fulfilment of the moral duties which their state imposes, is a natural concomitant of the spiritual primacy.

But the papal claim to authority over the temporalities of kings has gone far beyond these limits. From the 10th c. onward, popes have claimed and have repeatedly exercised a power of coercing kings, and of punishing them when refractory, by suspension, by deprivation, and by the transfer of the allegiance of their subjects to another sovereign. This well-known claim has been a subject of controversy in the Rom. Cath. Church between the Gallican (q.v.) and Ultramontane (q.v.) schools; and in the Ultramontane school, two different theories have been devised for its explanation. The first and extreme theory (which holds the power to be a direct one) supposes that this power was given directly from God to St. Peter and his successors, that the two powers are foreshown by the 'two swords,' Lk. xxii. 38, and that the temporal power is a privilege of the primacy by divine law, equally with the spiritual sovereignty itself. According to the second or *indirect* theory, the temporal power is not directly of divine institution, but is an indirect though necessary consequence of the spiritual supremacy; and is given only as a means of completing, and, in a corrupt and disorganized state, rendering more efficacious, the work which the spiritual supremacy is directly instituted to accomplish. It was in this latter form that the theory of the temporal power was defended by the great champion of Ultramontanism, Cardinal Bellarmine; and the celebrated Declaration of the Gallican Clergy (*Declaratio Cleri Gallicani*) 1682 (see GALLICAN CHURCH) was directed against it.

A third view of the temporal power, and one which has found many modern defenders, was propounded by the celebrated Fénelon (q.v.). According to his theory, generally described as the Historical Theory of the temporal

power, the pope does not possess, whether by direct divine appointment or in virtue of the necessities of his spiritual office, any temporal power whatsoever. But he possesses the plenitude of that spiritual power which is required for the government of the church, and he is empowered to enforce it by spiritual penalties, especially by excommunication or deprivation of membership of the church. Now, though excommunication and such other penalties, of their own nature, are purely spiritual, yet the religious sentiment of the mediæval period, and the awe with which it regarded the authority of the church, invested these penalties with certain temporal effects: see EXCOMMUNICATION.

The penalty of forfeiture of certain civil rights was attached by the law of England, in the case of private persons, to the spiritual censure of Excommunication (q.v.) The same penalty was applied by the laws of other countries to the sovereigns themselves: by the law of Spain in the sixth council of Toledo 638; by the law of France, as confessed by Charles the Bald 859; by the law of England, under Edward the Confessor; and by the so-called Saxon and Swabian codes of Germany. The last-named codes recognize in the pope, in certain specified cases, the right to excommunicate the emperor himself; and ordain that if the emperor remain 12 months without being absolved from the excommunication, he shall be deposed. In the appeal of the Saxon nobles to the pope against Henry IV., this law is expressly referred to; and even Henry himself, without denying the force of the law, sought his defense solely in a denial of the charge of heresy which was imputed to him.

From these and similar indications of the public feeling of the mediæval time, the advocates of this theory of the temporal power infer that orthodoxy and obedience to the pope, in all essential matters of faith and discipline, were by the consent, express or tacit, of sovereigns and of peoples accepted as a condition of the tenure of supreme civil authority—a condition similar in its character and objects to that which forms the basis of the limitation settlement of the succession to the English crown to the heirs of the Princess Sophia of Hanover, 'being Protestant.' Hence they conclude that the function really exercised by the popes in relation to heterodox or scandalously immoral sovereigns, or oppressors of the church and church liberties, was in itself a spiritual one, and that the civil consequences which it entailed of deprivation or deposition arose, not from the church law, but from the expressed or understood international civil law of the age. This view of the origin and nature of the pope's power over sovereigns and states may be regarded as the view now commonly received; being set forth not only by Rom. Catholic writers, but also by Leibnitz, Pfeffel, Eichhorn, Voigt, and others.

On the other hand, it is difficult, if not impossible, to reconcile this theory with the language used by the popes themselves in enforcing their claim to temporal authority, and with the arguments on which they rest that claim

As to the claim of temporal power exercised over nations which had revoked their assent to it (sometimes adduced against the 'historical theory'), it is to be viewed as merely a natural delay in adjustment to a new state of public feeling.

For the history of most of the principal instances of the exercise of this power by the popes, see the separate titles (of the particular popes or sovereigns concerned).—See Gosselin's *Pouvoir du Pape au Moyen Age.*

TEMPORARY, a. *tĕm'pō-rā-rĭ* [L. *temporārĭus*, lasting for a time only—from *tempus*, time]: lasting for a time only; transient; not permanent or in perpetuity. TEM'PORARILY, ad. *-ĭ-lĭ.* TEM'PORARINESS, n. *-nĕs*, the state of being temporary. TEM'PORIZE, v. *-rīz*, to humor or yield to the current of opinion or to circumstances; in *OE.*, to comply; delay. TEM'PORIZING, imp.: ADJ. complying with times or circumstances. TEM'PORIZED, pp. *-rīzd.* TEM'PORIZER, n. *-rī-zĕr*, one who temporizes; a trimmer. TEM'PORIZINGLY, ad. *-lĭ.* TEM'PORIZA'TION, n. *-rī-zā'shŭn.* the act of temporizing.—SYN. of 'temporary': transient; fleeting; transitory.

TEMPT, v. *tĕmt* [L. *temptārĕ* or *tentārĕ*, to try, to put to the test—from *tentus*, pp. of *tenērĕ*, to hold: F. *tenter*, to tempt]: to test; try; prove; entice; incite; allure; *especially*, to incite to something wrong by presenting plausible or alluring inducements; to solicit to an evil act; to allure; to incite; to provoke. TEMP'TING, imp. *-tĭng:* ADJ. adapted to entice or allure; attractive; seductive. TEMP'TED, pp. *-tĕd.* TEMP'TINGLY, ad. *-lĭ*, attractively; alluringly. TEMP'TER, n. *-tĕr*, one who entices to evil. THE TEMPTER, the devil. TEMPTATION, n. *tĕm-tā'shŭn* [F. *tentation*]: the act of tempting; enticement to evil from the prospects of pleasure or gain; state of being enticed to evil; anything presented to the mind as an inducement to an evil act; a strong inducement offered to the mind, good or bad.—SYN. of 'tempt': to entice; allure; seduce; decoy; attract; induce.

TEMSE, n. *tĕms* [AS. *temes*, a sieve: Dut. *tems*, a strainer]: in *prov. Eng.*, a sieve; a strainer: V. to sift. TEMSE-LOAF, bread made of sifted or fine flour.

TEN, a. n. *tĕn* [Goth. *taihun;* Ger. *zehn;* Dut. *tien;* L. *decem;* Skr. *dasan*, ten]: the sum of nine and one, or the figure or symbol denoting that sum. TENTH, a. *tĕnth*, the ordinal of ten: N. a tenth part; a tithe. TENTH'LY, ad. *-lĭ.* in the tenth place.

TENABLE, a. *tĕn'ā-bl* [F. *tenable*, tenable—from L. *tenērĕ*, to hold]: that may be held; capable of being maintained or defended. TEN'ABLY ad. *-blĭ.* TEN'ABLENESS, n. *-bl-nĕs*, or TEN'ABIL'ITY, n. *-bĭl'ĭ-tĭ*, state of being tenable.

TENACIOUS, a. *tĕ-nā'shŭs* [F. *tenace*, tenacious—from L. *tenax* or *tenācem*, holding fast—from *tenērĕ*, to hold]: holding fast, as opinions; inclined to hold fast; retentive; adhesive; cohesive; tough; obstinate; niggardly. TENA'CIOUSLY, ad. *-lĭ*. TENA'CIOUSNESS, n. *-nĕs*, or TENACITY, n. *tĕ-nās ĭ-tĭ* [F. *ténacité*—from L. *tenacĭtātem*]: quality of bodies which enables them to stick or adhere to others; that quality in bodies which enables them to resist a severe strain without rupturing or splitting—especially applied to metals, as gold, silver, copper, and iron, which can be drawn into wire (see TENACITY): retentiveness, as of memory. TENACE, n. *tĕn'ās*, in *whist*, a holding by the fourth hand of the first and third best cards.

TENAC'ITY: property of material bodies by which their parts resist a force tending to separate them. It is the result of the attractive forces exerted by the particles of matter on one another through the infinitesimally small spaces supposed to exist between them; hence it differs in different materials, and even in the same material at different degrees of temperature. For practical bearings of the T. of solids (especially wood and iron), see STRENGTH OF MATERIALS. As to the T. of metals in consequence of various processes, the following experimental conclusions may here be noted: forging and wire-drawing increase T. in the longitudinal direction: copper and iron have this property more than doubled, while gold and silver have it more than trebled by being drawn into wire. Mixed metals have usually greater T. than simple metals. See ALLOY.

TENACULUM, n. *tĕ-năk'ū-lŭm* [L. *tenacŭlum*, an instr for holding—from *tenĕō*, I hold]: in *surg.*, a fine-pointed hook for seizing and raising bleeding vessels, such as arteries, for the purpose of tying them.

TENAILLE, n. *tĕ-nāl'* [F. *tenaille*—from L. *tenacŭlum*, an instr. for holding—from *tenĕō*, I hold]: in *fort.*, work in low relief in the main ditch before the curtain, and between two bastions. It may either have two faces, in a line with the faces of the adjoining bastions, and meeting at the centre in a re-entering angle; or three faces, of which two are prolongations of the bastion faces, and one parallel to the curtain. The T. must be low enough for the defenders to be safe from the musketry-fire on one bastion defending a breach in the other bastion. This work is of great use in protecting the ditch, covering the postern from the enemy's view, etc. See FORTIFICATION. TENAILLE-HEAD, a field work consisting of a ditch and parapet forming a succession of triangles whose faces flank each other.

TENANT, n. *tĕn'ănt* [F. *tenant*, holding; *tenir*, to hold—from L. *tenērĕ*, to hold]: one who holds possession of lands or houses under another; one who has the possession and use of any place on certain conditions (see below: also LANDLORD AND TENANT): dweller, occupier: V. to hold or occupy, as a tenant. TEN'ANTING, imp. TEN'ANTED, pp.: ADJ. occupied by a tenant. TEN'ANCY, n. *-ăn-sĭ*, the holding or possession of lands or houses on certain condi-

tions and for a specified time. TEN'ANTLESS, a. *lĕs*, without a tenant. TEN'ANTABLE, a. *-ănt-ă-bl*, fit for occupation; in a state of suitable repair. TEN'ANTRY, n. *-ănt-rĭ*, the whole body of tenants on an estate. TENANCY AT WILL, in law, occupation by a tenant for no fixed term other than the will or caprice of the landlord or proprietor. In general, courts are averse to assume a tenancy at will if there are materials to satisfy the description of a yearly tenant. Rent is payable according to the time of occupation, and the tenancy can be determined by either party at any time; but the tenant, if too suddenly dispossessed, has right to a reasonable time for removal of furniture, and can, if requisite, re-enter the lands to reap a crop sown. (See LANDLORD AND TENANT.) TENANCY IN COMMON, in law, lawful holding of lands and tenements by two or more persons at once, under several and distinct titles, and not by a joint title. The subject-matter of the tenancy may be either real or personal property. Tenants in common have to give accountto one another of the profits of the estate; they also have reciprocal right of action on account of waste or depreciation of the estate. TENANCY ON SUFFERANCE, tenancy with no title, and wrongfully continuing. Thus, when the term has ended, and the tenant has got notice to quit, but does not, he continues a tenant on sufferance, and may be ejected at any time, unless a new arrangement is made. TENANT FOR LIFE, in law, one who has not the absolute property, but only an interest in it, which ceases with his own life, or the life of another. An estate for life in lands is classed with freehold estates. (See LIFE-ESTATE.) TENANT IN FEE SIMPLE, one who is absolute owner, the fiction being that all were originally tenants of the crown. A tenant in fee simple has a freehold estate of inheritance, the highest degree of property known to the law. He has an absolute right to the soil and the mines down to the centre of the earth, and has a right to build as high as he pleases. If he dies, the estate goes to his heirs—i.e., his heirs general; but he has power to devise it to whom he pleases, subject to certain restrictions, in cases where the donee is a charitable corporation or trustee for charitable purposes: see MORTMAIN. TENANT IN TAIL: see TAIL: ESTATE: ENTAIL. TENANT IN CAPITE, *kăp'ĭ-tē* [L. *in capite*, in chief]: *anciently*, one who held immediately from the crown.

TEN'ANT RIGHT, legal or equitable property of one who holds land as a renter, in the improvements that he makes therein; consequently such a one's non-obligation to pay advanced rent on account of his own improvements; his title to keep possession at a fair (i.e., fairly adjudicated) rent: in short, the just and equitable status of a renter in face of the landlord. The essentials of T. R. (as conceived by leaders of popular opinion in Ireland, where the question of T. R. has been most agitated in recent times) are summed up in 'the three F's'—Fair Rents, Fixed Tenure, Free Sale. The British parliament has more or less completely established these three points, and by the act of 1881 the tenant may apply to a court to

have a rent fixed (Fair Rents); the tenant (with certain exceptions) may sell his tenancy (Free Sale); when increased rent is demanded, the tenant can obtain through the court a statutory tenancy for 15 yrs. (Fixed Tenure). And if the tenant refuses to pay the advanced rent, he vacates the tenancy, but has lawful claim to compensation both for 'disturbance' and for his improvements.—But the cry of T. R. is not heard outside of Ireland. The larger question of the nationalization of land and the project of the Single Tax (see TAX, SINGLE) are at the front, displacing attempts at reconciling the mutual demands of landlords and tenants by such compromises as are involved in mere Tenant Right.

TENASSERIM, *tĕn-ăs'ĕr-ĭm:* southernmost division of the province of Lower Burmah (the others being Pegu (q.v.) and Aracan (q.v.) and Irrawadi); 9° 30′—19° 30′ n. lat., 95° 50′—99° 30′ e. long.; 46,730 sq. m.; acquired by Britain 1826 after the war.

T. is a narrow line of coast about 500 m. long, with varying breadth from 40 m. at its s. extremity to 80 m. T. is divided into six administrative districts, besides the town of Moulmein: Toungu, area 6,354 sq. m.; Schwe-gyen, 5,567 sq. m.; Salwen, 4,646 sq. m.; Amherst, 15,193 sq. m.; the town of Moulmein, 10 sq. m.; Tavoy, 7,200 sq. m.; and Mergui, 7,760. The principal town is Moulmein; the next in importance being Toungu and Mergui.

Physical Features.—The general aspect of the country is bold and picturesque. A mountain range 5,000 ft. high, forming the e. frontier, is the water-shed between the Tenasserim and Siamese river systems. The s. portion is little else than a wilderness of thickly wooded hills, inclosing long and narrow valleys. The soil of the plains is very fertile, and suited to growth of rice, indigo, cotton, sugar, and vegetables. Tobacco grows chiefly on the banks of rivers in the hills. Forests occupy two-thirds of the area. The largest river, the Salween, has its source in Tibet, but is navigable only a few miles above Moulmein. The principal ports of T. are Moulmein (q.v.), Amherst, Tavoy, and Mergui, of which Moulmein is the best. The Mergui archipelago, off the s. coast of T., consists of almost innumerable islets, some of which are said to be rich in iron ore: and they are famous for edible birds' nests. The country has vast stores of mineral wealth, now absolutely neglected. At Kahan, on Mergui Island, are rich and accessible tin-mines—the ore yielding 75 per cent. of the pure metal not far from the surface.

Botany.—The botanical productions of T. may vie with those of any part of the world. There are more than 100 kinds of timber-trees, the teak the most important. The celebrated *Amherstia nobilis* is the most splendid of the many flowering and ornamental trees. The palm tribe are in great variety.

The *climate* of T. is regulated by the monsoons; and the wet and dry seasons divide the year into two nearly equal parts. The cool season lasts from the cessation of the rains in Oct., when the n.e. monsoon begins, to the middle

of February: afterward the heat increases daily till the s.w. monsoon again brings clouds and rain.

Commerce.—Principal exports are rice, teak and other timber: the first is the staple article of commerce.

Inhabitants.—The people mostly are Burmans proper; but there are other races, as Talaings, descendants of the ancient Peguans; Karens, a dispersed people, inhabiting secluded mountain districts—among whom Christianity has made progress, through the labors of American missionaries; Toungthoos, Khyengs, Shans, Europeans and their descendants, Chinese, and Indians. Pop. (1881) 825,741; of whom 698,304 are Buddhists, about 23,145 Hindus, 24,786 Mohammedans, 28,315 Christians; (1891) 971,660; (1901) 1,376,776.—*The Natural Productions of Burmah and the Tenasserim Provinces,* by the Rev. F. Mason (Maulmain 1850); *British Burmah,* by Capt. Forbes (1878).

TENBY, *tĕn'bĭ:* parliamentary and municipal borough, and thriving watering-place, of S. Wales, county of Pembroke; 10 m. e. of the town of Pembroke. Its charming situation on a peninsula, overlooking the Bay of Caermarthen, its salubrity, and its bathing facilities have made it one of the most favorite watering-places in Wales; the season is from June to Oct. There are considerable remains of the ancient embattled walls. The parish church is large and beautiful. Fishing is extensively carried on. Pop. 4,400, increased by one-half in summer.

TENCH, n. *tĕnsh* [OF. *tenche;* F. *tanche*—from L. *tinca,* the tench]: a fresh-water fish of the genus *Tinca* and family *Cyprinidæ* (the Carp family). It is a fish of a thick form, with small scales, and a barbel at each side of the mouth, the teeth on the pharynx compressed and club-shaped. The COMMON T. (*T. vulgaris*) is an inhabitant of ponds and other stagnant waters in Europe and n. Asia. It passes the winter in a torpid state, concealed in the mud. It is of a greenish or sometimes deep yellowish-brown color, more rarely golden. Instances have occurred of its attaining a length of three ft., but a tench of half that length is unusually large. It is very tenacious of life, and, like the carp, can be conveyed to a distance alive in wet moss. The flesh is soft and insipid, except when it is very well fed, when it becomes delicate and pleasant. It is commonly placed in ponds with carp. Its touch was formerly supposed to be curative of disease; and the pike was said to be aware of this, and to refrain from injuring the tench.

TEND, v. *tĕnd* [an abbreviation of ATTEND]: to attend, or be attentive to; to watch; to guard; to accompany; to hold and take care of; in *OE.*, to wait: to expect; to wait upon, as a servant. TEND'ING, imp.: N. in *OE.*, the act of attending; care; attendance. TEND'ED, pp. TEND'ANCE, n. *-ăns,* care, attention; in *OE.*, persons attendant; state of expectation.

TEND, v. *tĕnd* [F. *tendre*, to lead, to conduct—from L. *tendĕrĕ*, to stretch out, to extend: It. *tendere*]: to move in a certain direction; to be directed to an end or purpose, have a leaning; contribute; to aim; to begin to swing round, as an anchored vessel at the turn of the tide. TEND ING, imp.: N. among *seamen*, a swinging round or movement of a ship upon her anchor TEND'ED, pp. TEND'ENCY, n *ĕn-sĭ*, direction or course toward a place, object, or result, inclination; aim. TEND'ENCE, n. *-ĕns*, OE. for TENDENCY.—SYN of 'tendency': disposition; inclination; proneness; bent; drift; bias; turn; propensity; aim; scope

TENDA, COL DE, *kol dĕh tĕn'dâ:* a pass over the Maritime Alps: see ALPS.

TENDER, n. *tĕnd'ĕr* [from *tend*, to accompany]: one who tends; a nurse; a small vessel that accompanies a larger, carrying for its use provisions and other stores, or as a dispatch-boat to convey intelligence: on *railways*, a carriage attached to a locomotive, containing the supply of fuel, water, etc.

TENDER, v. *tĕnd'ĕr* [F. *tendre*, to hold out—from L. *tendĕrĕ*, to stretch out]: to present for acceptance; offer in payment or satisfaction of a demand; in *OE.*, to regard; to hold dear; to esteem: N. an offer of money to pay a debt or obligation incurred (see TENDER, LEGAL): an offer in writing made by a contractor or tradesman to execute certain specified work or provide certain things at a certain sum or rate; the thing offered; generally, any offer for acceptance TEND'ERING, imp. TEND'ERED, pp. *-ĕrd*.

TENDER, a. *tĕn'dĕr* [F. *tendre*, tender, soft—from L. *tener*, soft, young: It. *tenero*]: easily impressed, bruised, or injured; not firm or hard, as plants; not tough, as meat; easily pained; exciting the softer feelings; not hardy; young; feeble; weak; susceptible of the softer passions, as love or compassion; affectionate; likely or apt to give pain, as a *tender* subject; pitiful; careful not to injure, or excite pain; soft: delicate: V. in *OE.*, to regard with kindness. TEN'DERLY, ad *-lĭ*, softly; gently; kindly. TEN'DERNESS, n. *-nĕs*, the state or quality of being tender; softness; state of being easily hurt or pained; compassion; kindness; extreme care not to give pain or offense; cautious care not to injure; softness or pathos of expression; susceptibility of the softer passions. TENDER-HEARTED, a. having great sensibility; very susceptible of the softer passions or emotions. TENDER-HEARTEDNESS, n. the state or quality of being tender-hearted. TENDERLOIN, that part of the loin of beef which lies close to the backbone on the ventral side, and is more tender than the rest; the under-cut.—SYN. of 'tender, a.': soft; effeminate; delicate; compassionate; amorous; gentle; mild; young; weak; kind; humane; pitiful; merciful; benign; benevolent; piteous; clement; susceptible

TENDER, LE'GAL: money of such character that a creditor is by law required to accept it when offered in payment of a debt, in default of any different mode of payment named in the contract or agreement. In the United States, legal T. comprises all U. S. gold coins of the legal weight, U. S. silver dollars of 412½ grains, unless the contract excludes them; smaller U. S. silver coins in sums not exceeding $10; the nickel and copper tokens or coins to the amount of 25 cents. U. S. notes are legal T. for all debts public and private, except duties on imports and interest on the public debt. Gold certificates and silver certificates are legal T. for all public dues whatever: so too are treasury notes issued under act of 1890, July 14: these treasury notes are legal T. also for private debts. The notes of national banks are legal T. for all purposes public and private, except duties on imports, interest on the public debt, and redemption of national currency.

TENDINOUS: see under TENDON.

TENDON, n. *tĕn'dŏn* [F. *tendon*, a tendon—from L. *tendĕrĕ*, to stretch: It. *tendine*]: the sinew which fastens muscle to bone. TEN'DINOUS, a. *-dĭ-nŭs* [F. *tendineux*]: consisting of or resembling tendons; full of tendons; sinewy.—*Tendon*, in anatomy, designates the white fibrous tissue reaching from the end of a muscle to bone or some other structure which is to serve as a fixed attachment for it, or which it is intended to move. In accordance with their form, tendons have been divided into the three following varieties: (1) *Funicular*, or rope-like, as the long tendon of the biceps muscle of the arm; (2) *Fascicular*, as the short tendon of that muscle, and as the great majority of tendons generally; (3) *Aponeurotic* or tendinous expansions, sometimes of considerable extent, serviceable in strengthening the walls of cavities, e.g., the tendons of the abdominal muscles.

The tendons commence by separate fascicles from the end of each muscular fibre, and they similarly terminate by separate fascicles in distinct depressions in the bones, besides being closely incorporated with the periosteum. In some birds, whose tendons are black, the periosteum is black also, from this incorporation. If a T. is ruptured by an accident, or divided by the surgeon, the two ends, if not too far separated, unite with extreme readiness by formation of intervening plastic material which soon acquires great firmness. So rapidly is this repair carried on that, according to Paget, a specimen, six days after division, could bear the weight of 25 lbs.; and another specimen, after 21 days, bore a weight of 56 lbs. When the interval between the two ends of a T. exceeds a certain limit, there will be only an imperfect bond of union, and either partial or total loss of use of the muscle will result.

Among diseases of tendons, *inflammation* is frequent. Independently of gout and rheumatism, the most usual cause is a sprain or wrench in the neighborhood of a joint, occasionally productive of long-continued wearing pains, assuming much of a rheumatic character. In one of the forms of Whitlow (q.v.), known as *Paronychia gravis*, or

tendinous whitlow, the tendons and their sheaths in the finger and hand are the seat of a severe and often destructive inflammation, often confined to one finger, but sometimes extending to the hand and arm, even exposing the bones, and disorganizing the joints. It arises from slight punctures or wounds, with or without inoculation of irritant or poisonous matter, and often without any apparent cause, except derangement of the general health. There is always an invasion of one of the forms of bacteria which excite inflammation. It begins with severe throbbing pain in the palmar surface of a finger, which extends along the arm: there is extreme tenderness, and some redness and swelling, with great tenseness of the parts. If the inflammation is not checked, suppuration soon ensues, accompanied by much constitutional disturbance; and the matter frequently extends among the muscles. In the early stage, hot poultices or hot applications of antiphlogistine or other kaolin paste, preceded or not by free leaching, may be useful. The hand should be kept elevated; and an active purgative, with low diet, prescribed. If these remedies fail, a free incision must be made along the centre of the palmar aspect of the finger—giving relief, by removing the tension, and allowing the escape of blood, even if little or no pus is discharged. Under this treatment the disease generally yields; though occasionally the suppuration produces such results as to render amputation of the arm necessary, or even to cause death. A permanently bent finger, from adhesion of the tendon to its sheath, is a frequent result in severe cases.

Tendons are sometimes the seat of syphillitic enlargements or tumors. Malignant tumors scarcely ever spring from tendons; but fibrous tumors and small cartilaginous enlargements are frequent.

Rupture of the tendons is in rare instances caused by sudden and violent muscular action. The long tendon of the biceps cubiti is very liable to this injury, which, in this case, is due more often to the disorganization caused by chronic rheumatic gout than to mere mechanical violence. The other tendons most frequently ruptured are the tendo Achillis, and the tendons of the rectus femoris and the triceps humeri. When a tendon is ruptured or divided by a surgical operation (tenotomy), the part attached to the muscle is drawn away from the opposite end for a variable distance by the contraction of the muscle. Blood is poured out between the ends, but much less than in rupture of muscles. The pain is not very great; a shock, however, is felt, as from a blow received on the part, accompanied by cramp of the muscle, and inability to use the limb; and in rupture of the tendo Achillis, a feeling is described as if the heel were sinking into a hole in the floor. The essential point in the treatment of a ruptured tendon is to keep the injured part in a state of constant rest and muscular relaxation, so that the separated ends may be approximated as much

as possible, and to prevent any violent extension till firm union has been reëstablished.

TENDRIL, n. *tĕn'drĭl* [OF. *tendrillon,* a tendril—from F. *tendre,* tender (see TENDER 3); F. *tendron,* the tender shoot of a plant]: the twining-shoot of a climbing plant by which it attaches itself to an object for support: ADJ. clasping; climbing as or as by a tendril.

TENE'BRIO. See MEAL-WORM.

TENEBRIOUS, a. *tĕ-nē'brĭ-ŭs,* or TENEBROUS, a. *tĕn'ĕ-brŭs* [L. *tenĕbrōsus,* full of darkness, gloomy—from *tenĕbræ,* darkness]: dark, gloomy. TEN'EBROUSNESS, darkness; gloom. TENEBRIFIC, a. *tĕn-ĕ-brĭfĭk* [L. *facĭō,* I make]: producing darkness.

TENEBROSI, n. *tĕn-ā-brō'sē* [It.]: in *art,* school of artists, called also Caravaggeschi, after its founder, Caravaggio; characterized by powerful rendering of chiaroscuro.

TENEDOS, *tĕn'ė-dŏs* (Turk. *Bogdsha-Adassi*): island belonging to Turkey, in the n.e. of the Ægean Sea, off the coast of the Troad, about 17 m. s. of the western entrance to the Strait of the Dardanelles. It is about five m. long by two m. broad, rocky, but productive. The chief town, also called Tenedos, or *Bogdsha,* has a trade in wine. Pop., Greeks and Turks, more than 5,000.

TENEMENT, n. *tĕn'ĕ-mĕnt* [F. *ténement,* a tenement —from mid. L. *tenemen'tum,* a holding—from L. *tenērĕ,* to hold: It. *tenimento,* a holding, a keeping]: a holding, as of lands or houses; building or house for habitation; one or more apartments in the same building used by one family (see TENEMENT-HOUSES, ETC.); a habitation. TEN'EMENT'AL, a. *-ăl,* pertaining to tenanted lands. TEN'EMENTARY, a. *-ėr-ĭ,* held, or that may be held by a tenant or tenants. TENEMENT-HOUSE, a house or building divided into separate dwellings.

TENEMENT-HOUSES—APARTMENT HOUSES—FLATS: terms, of which the first (including the other two) is defined by law as a house occupied by 3 or more families, living independently, and doing their cooking on the premises; or by more than 2 families on a floor, so living, and having a common right to halls, stairway, etc. Tenement house is a generic term, including what are popularly called apartment houses and flat houses or flats, as well as tenements. The attempt has sometimes been made in framing tenement house laws or regulations to distinguish between apartment and tenement houses, but no satisfactory line of separation has ever been suggested, nor is there any legal regulation properly applicable to tenement houses, as popularly defined, which should not equally apply to apartment houses, or which presumably would not be adopted by intelligent owners of such houses from motives of self-interest.

Tenement House Reform.—A movement to better the housing conditions of the working classes in cities, which

originated about the middle of the 19th century and has gradually become national in character in the United States and Great Britain. In the United States it has taken the form of the regulation by state law or city ordinance of the construction, maintenance and care of tenement houses, whence its title. In Great Britain this movement has been directed to all kinds of houses, including tenement houses, and is usually called by its more generic title of 'Housing Reform.' The initiative of the movement has been benevolent impulse, but the strong forces behind it which have given impulse to that initiative and have united to carry the movement forward have been the same which have evolved sanitary and building regulation, and are founded quite as much on self-interest as altruism.

History.—The movement for tenement house reform in the United States naturally began in New York, its largest city, where the need for regulation first became apparent, and may be said to date from 1842, when Dr. John H. Griscome, the city inspector of the board of health, called attention to tenement conditions in a special report on the sanitation of the city. It has since extended to almost all large cities in which tenement houses have been erected, and has taken the form sometimes of state law, as in New York and Massachusetts, or more often of city ordinance, as in Chicago and Philadelphia. The legislation in New York is the result of the investigations and recommendations of successive state commissions—1856, 1884, 1894, 1900—and the scope of inquiry of the last commission which is typical, has been 'To make a careful examination into the tenement houses in cities of the first class; their condition as to the construction, healthfulness, safety, rentals, and the effect of tenement house life on health, education, savings, and morals of those who live in tenement houses and all phases of the so-called tenement house question in these cities that can affect the public welfare.' The chief subjects of tenement house regulation may be grouped under three general classes: protection against fire and means of escape in case of fire, light and ventilation, and sanitary protection, the latter including water supply, water-closet accommodation and overcrowding.

Model Tenements.—The erection of model tenements, so called, of large size, from motives primarily philanthropic, has been less frequent in the United States than in Great Britain. The best known and earliest are the 'Home Buildings' and 'Tower Buildings,' which were erected by Alfred T. White in Brooklyn; the first named in 1879. The erection of these buildings, which have been financially successful from the start, was an epoch in the cause of tenement reform. It led indirectly to the tenement house law of 1879. The most recent model tenements are those of the City and Suburban Homes Company, of New York, of which E. R. L. Gould is

president. The erection by Mrs. Vanderbilt of model tenements for the exclusive use of families having one or more cases of tuberculosis, supplies accommodations for 450 families.

Great Britain.—The movement for housing reform in Great Britain has had a somewhat different direction from its American counterpart The evils there have been more largely slum conditions than those resulting from tall buildings and unventilated and unlighted rooms. The particular evils of the tall tenement practically exist only in Edinburgh and Glasgow. Consequently English and Scotch effort has been directed mainly toward the demolition of unsanitary areas, and more recently, the erection of municipal tenements by the city governments themselves. These movements, at first local and authorized under local acts, such as the Glasgow improvement act of 1866, and the Liverpool sanitary amendment act of 1868, have been made general by the housing of the working classes act of 1890, and many slum areas have been destroyed and municipal tenements built in their place, notably in the cities of London, Glasgow, Manchester, Liverpool, and Edinburgh. Tenement house regulation in Great Britain emphasizes the same general subjects and follows the same lines as American regulation. Limitations upon height are general, and more drastic than in America. Such houses are limited in London to 80 feet, without special consent of the council, and may not exceed the distance between the front wall of the building and the opposite side of the street in streets less than 50 feet wide. In Edinburgh they are limited to one and one quarter times the width of the street; in Liverpool and Glasgow to the actual width of the street; in Manchester to two stories in streets of less than 30 feet in width and to three stories in wider streets up to a width of 36 feet. Tenement regulations on the continent usually form part of the general building regulations. The regulations for Paris and Berlin are very elaborate, but proceed under the same general lines as in England and American cities. In Berlin, houses fronting on the street may only be as high as the width of the street. In Paris a somewhat greater latitude is allowed in this particular.

No American city has imitated the English example of building municipal tenements, nor has such action ever been seriously proposed. Serious objections to any such extension of the sphere of municipal activity would exist in any American city. Moreover, municipal building would discourage and restrict building by private enterprise, which has proved sufficient to meet the demand. The problem is too large for any American city to deal with it successfully by the use of any amount of public funds likely to be put at its disposal for such purposes. Halfway measures by preventing private enterprise would only increase the evil which they sought to remedy.

Bibliography.—De Forest and Veiller, *The Tenement House Problem* (1903); Gould, *The Housing of the Working People* (1895); Riis, *How the Other Half Lives* (1890); *The Battle with the Slum* (1899); *First Report of the New York Tenement House Department* (1904).

TENERIFFE, n. *tĕn-ėr-ĭf':* a wine from Teneriffe, one of the Canary Islands, resembling Madeira, but a little more acid.

TENERIFFE, *tĕn-ėr-ĭf',* or TENERIFE, *tā-nā-rē'fā:* largest of the Canary Islands (q.v.).

TENERIFFE' (or TENERI'FE), PEAK OF; or PICO DE TEYDE, *pē-ko dā tā'ē-dā:* famous dormant volcano, highest summit in the Canary Islands; in the s.w. of the island of Teneriffe; 12,182 ft. above sea-level. The lower slopes of the mountain are covered with forests or with extensive meadows; but the upper ridges and the Peak, properly so called, are wild, barren, and rugged. The Peak and its two inferior neighbors, *Montana Blanco* and *Chajorra,* rise from a rugged circular plain of lava débris and pumice, 7,000 ft. above sea-level, about 8 m. in diameter, fenced in on all sides by an almost perpendicular wall of rock. From the crevices of these mountains sulphurous vapors are constantly exhaling. The Peak is visible more than 100 m. at sea; but the view from it is generally destroyed by the dense masses of clouds which hang over the surrounding sea at an average height of 4,000-5,000 ft., the sky above being almost uniformly clear and bright. For astronomical observations from Teneriffe, see *Tenerife,* by C. Piazzi Smyth (London 1858).

TENESMUS, n. *tĕ-nĕs'mŭs* [L. *tenesmos;* Gr. *teinesmos,* a straining at stool—from Gr. *teinō,* I distend, I strain. F. *ténesme*]: in *med.,* a constant desire to go to stool, with great straining but no discharge (except perhaps mucus), no fecal matter being present in the rectum: it is a common symptom in dysentery, etc. TENES'MIC, a. *-mĭk,* relating to or characterized by tenesmus.

TENET, n. *tĕn'ĕt or tē'nĕt* [L. *tenet,* he holds—from *tenĕō,* I hold]: that which a person firmly believes and maintains as a part of his creed; dogma; article of belief.—SYN.: doctrine; opinion; position; principle.

TENFOLD, a. *tĕn'fōld* [*ten,* and *fold*]: ten times as much or as many.

TENGIZ', or TENGHIZ', or TENGUIS': see BALKASH.

TENIERS, *tĕn'yėrs,* DAVID, the Elder: Flemish artist, 1582-1649; b. Antwerp. For some years he was pupil of Rubens; afterward he visited Italy, where he studied under Adam Elzheimer, and on his return settled in his native city, where he died. The subjects of Teniers's pencil are in general very homely, often low—the in-

teriors and exteriors of public-houses, smoking-rooms, rustic games, weddings, etc.; but they are executed in the most vividly realistic manner, with charm of color and happy ease of composition.

TEN'IERS, DAVID, the Younger: Flemish artist: 1610, Dec. 15—1690, Apr. 25; b. Antwerp; son of David T., the Elder. He received his first lessons in art from his father, who, it is said, subsequently placed him in the studio of Adrian Brauwer; but this statement can scarcely be true, for Brauwer (q.v.) was only two years older than himself. The elder Teniers may be considered founder of a school of which the younger is far the most brilliant and prolific member. Teniers rapidly rose into distinguished repute. He gained the admiration and friendship of Archduke Leopold, Queen Christina of Sweden, Don John of Austria, tne Prince of Orange, the bp. of Ghent, and other dignitaries. Teniers lived in a villa on the outskirts of Malines, where he studied closely that humble rustic life which he so charmingly depicted in all its aspects. He removed 1647 to Brussels, where he died. He was twice married: first to a daughter of the painter Breughel (q.v.), *Velvet* Breughel, as he was called; and again to the daughter of a councilor at the court of Brabant. He made himself unhappy with a long effort to secure knightly rank.—Teniers was recognized as one of the great painters of Europe; and his repute has not lessened with lapse of time. The number of his pictures is marvellous. Smith, in his *Catalogue Raisonné,* has described more than 700. England is peculiarly rich in specimens, but they are also liberally scattered over the galleries and private collections of the continent, and, in spite of their number, bring great prices. In the coloring of his skies, the sketching of his trees, the animation and grouping of his figures, the distribution of light and shade, and in his truth to physiognomy, is evinced a rich, fine, and imaginative genius

TENNANT, *tĕn'ant,* WILLIAM: remembered as author of *Anster Fair:* 1784-1848, Feb. 15; b. Anstruther, in Fife, Scotland. A cripple almost from his birth, he betook himself naturally to study. After two years at the Univ. of St. Andrews, he was obliged by lack of funds to quit his studies, and was for eight years clerk to his brother, a corn-agent. In 1813 he was fain to accept the situation of parish schoolmaster at Denino, a hamlet about four miles from St. Andrews, with a salary of £40 a year—having in his leisure studied Greek, Latin, Hebrew, French, and German. The year before, he had published his *Anster Fair,* a fantastic poem of rich diction and amazing sprightliness and humor; notable as the first attempt to naturalize in our language the gay *ottava rima* of the Italians; soon afterward adopted by Byron with splendid success in his *Beppo* and *Don Juan.*

The poem gave him great repute; and 1816 he became teacher of a school at Lasswade, near Edinburgh; and three years afterward received a mastership in the Academy of Dollar, Clackmannanshire. Through the influence of Lord Jeffrey, he was appointed, 1831, professor of oriental languages in the University of St. Andrews. He published, 1840, grammars of Syriac and Chaldee. He was of genial and amiable disposition. Besides other verse, he published, 1822, *The Thane of Fife, a Poem;* 1823, *Cardinal Beaton, a Tragedy;* and 1825, *John Baliol, a Drama.*

TEN'NANTITE: an isometric, metallic mineral, isomorphous with tetrahedrite. It is essentially a copper sulph-arsenite, differing from tetrahedrite, into which it passes by insensible gradations, only in the preponderance of arsenic instead of the antimony which distinguishes the latter. Its color and streak are usually iron-black; it often has a brilliant metallic lustre; its hardness varies widely from 3 to 4.5; its specific gravity is also quite variable, 4.4 to 5.1. It occurs in fine specimens in the mines of Cornwall, England, in Bolivia and Colorado. When sufficiently abundant it constitutes a valuable copper ore.

TENNENT, *tĕn'ĕnt,* GILBERT: 1703, Feb. 5—1764, July 23; b. Ireland: Presb. minister. He went to Philadelphia 1718; aided his father in conducting an acad.; was ordained pastor of a Presb. church at New Brunswick, N. J., 1726, where he remained 17 years; accompanied Whitefield on a New England preaching tour 1740-1; and founded a church in Philadelphia of Whitefield followers 1743. He published sermons and addresses.

TEN'NENT, SIR JAMES EMERSON, LL.D.: author: 1794, Apr. 7—1869, Mar. 6; b. Belfast; son of William Emerson. He graduated at Trinity College, Dublin; was called to the bar 1831; married the daughter and heiress of William Tennent, whose name and arms he assumed, 1831; was member of parliament several times; secretary to the Indian board 1841-45; procured passage of an act for copyrighting designs 1843; knighted and made civil secretary to the colonial government of Ceylon 1845; was a joint-secretary to the board of trade 1852-67; and was created baronet 1867. He was author of many works, chiefly *Ceylon,* 2 vols. (1859).

TEN'NENT, WILLIAM, D.D.: Presbyterian clergyman: 1705, Jan. 3—1777, Mar. 8; b. in n.e. Ireland; bro. of Gilbert Tennent, and son of the Rev. William Tennent, who came to this country 1718. Before completing his theological studies, while ill he fell into a trance, and was thought to be dead. He described his experience while seemingly dead as a beholding of the heavenly glory; and for years it rendered this world undesirable to him in comparison. He was pastor at Freehold, N. J., from 1733 until his death.

TENNESSEE, *tĕn-nĕs-sē′:* state; one of the United States of America; 3d in order of admission into the Union; ranking (1880) 6th in product of tobacco, 7th in copper, and 9th in corn and cotton; and (1902) 5th in tobacco production and 6th in pig iron production, and 3d among the S. States; 13th in coal production, and 14th in population; named from Tannassee, Indian for Little Tennessee river; popularly known as the 'Big Bend State.' Pop. (1910) 2,184,789.

Location and area.—T. is in lat. 35°—36° 30′ n., long. 81° 37′—90° 28′ w.; bounded n. by Ky. and Va., e. by N. C., s. by Ga., Ala., and Miss., w. by Ark. and Mo.; extreme length e. to w. 432 m., extreme breadth n. to s. 109 m., water surface 300 sq. m., land surface 41,750, total 42,050 sq. m. (26,912,000 acres); greatest elevation Unaka Mountains, 5,000 feet above sea-level; cap. Nashville.

Topography.—The surface is strongly diversified, trending from the e. border, 5,000 ft. above sea-level, to the Mississippi river on the w. border, and exhibiting high mountain ranges, a rocky plateau 2,000 ft. above sea-level, a great tract of highlands comprising 9,300 sq. m., a lower and very fertile central basin, a rolling plain 84 m. wide, and a flat. alluvial plain in the Mississippi bottoms, of about 900 sq. m. The Unaka, or Great Smoky Mountains, on the e. border, are a part of the great Appalachian chain, extend entirely across the state, have several river passages, and contain numerous small and fertile valleys. The second mountain range is the Cumberland table-land, which also extends across the state, and has several spurs, that of Walden's Ridge containing peaks much higher than the general level of the table-land. Between the two ranges is the fertile valley of e. Tenn., and between the Cumberland table-land and Walden's Ridge is the valley of the Sequatchee. The famous Lookout Mountain belongs to the Cumberland range, and is partly in Tenn. and partly in Ga. In the civil divisions of the state e. Tenn. extends from the e. boundary to the middle of the Cumberland table-land; middle Tenn. thence to the lower Tennessee river; and w. Tenn. thence to the Mississippi river. The state is well drained by three great river systems. The first on the e. is the Tennessee, which is the chief affluent of the Ohio river, rises in the Alleghany Mountains in Tazewell and Wise cos., Va., receives the Holston and Clinch rivers, flows s.w., enters Ala. at its n.e. corner, re-enters Tenn. at the n.e. corner of Miss., flows due n. through Tenn., and empties into the Ohio at Paducah, Ky. The second is the Cumberland, which rises in Ky., on the w. slope of the Cumberland Mountains, near the Va. boundary, flows w. and s.w. till it enters Tenn. in Clay co., then takes a s. and w. course around Nashville, thence n. and w. to the centre of Montgomery co., passes out of the state in Stewart co., and empties into the Ohio river in Livingston co., Ky. The third is the Mississippi, the w.

CAPITOL AT NASHVILLE.

boundary of the state. Both the Mississippi and the Tennessee rivers contain several islands.

Climate.—The mean temperature in the n. is in e. Tenn. 56°, middle Tenn. 57°, w. Tenn. 58°; in the central part in e. Tenn. 57°, middle Tenn. 58°, w. Tenn. 59°; in the s. in e. Tenn. 58°, middle Tenn. 59°, w. Tenn. 60°; at Nashville 37°—48° in winter, 75°—81° in summer. The annual rainfall at Knoxville is 59·25 in., Memphis 49·39. Snow falls occasionally, but is never deep or lasting.

Geology.—The predominant formations are the alluvial, tertiary, and cretaceous; the paleozoic, lower Silurian, and sub-carboniferous; the carboniferous; the Silurian; and the lower Silurian and calciferous sand rock; all comprising five distinct belts. The economic properties are coal, iron, copper, limestone and other building stone, marble in large variety, mill-stone, lithographic stone, granite, lead, zinc, asbestos, petroleum, potter's and fire clays, black oxide of manganese, nitrate of potassa, alum, salpetre, gypsum, sulphate of soda, and salt. Mineral springs of much value abound in the Unaka Mountains, sparkling chalybeate in the Cumberland table-land, and sulphur and chalybeate in the w. portion.—T. is exceedingly rich in forest growths, nearly one-half the entire land surface bearing trees of high commercial value. These include 3 species of ash, 3 of maple, 6 of hickory, about 15 of oak, 2 of pine, 3 of poplar, 3 of elm, 2 of walnut, several of willow, and beech, birch, red cedar, chestnut, cottonwood, cypress, dogwood, sycamore, laurel, holly, hackberry, and box elder. There is an abundance of fruit trees; and in the w. part of the state numerous small fruits and berries, some almost tropical in genus or family, grow luxuriantly. Grasses are prolific; foreign ones thrive well, and there are several indigenous to the state.

Zoology.—The mountains and forests still contain wild animals, e.g., the bear, raccoon, fox, opossum, hare, and squirrel; the rattlesnake, moccasin, and many harmless snakes abound; lizards and horned frogs are often seen; alligators occasionally appear in the bayous of the Mississippi river; and birds of prey, plumage, and song are plentiful throughout the state.

Agriculture.—Agriculture leads among the industries of the state. There are over 225,000 farms, comprising about 25,000,000 acres, nearly one-half of which is improved land. The total value of all farm property, including live stock, is well over $500,000,000. The principal crops are Indian corn, wheat, tobacco, cotton, peanuts, sorghum, oats, hay, fruit and vegetables. The breeding of stock has long been important, particularly the breeding of horses, mules, sheep, and swine.

Manufactures.—There are about 10,000 manufacturing establishments, with annual aggregate products amounting to over $125,000,000. The principal indus-

tries are lumber and timber products; flour and grist mill products; iron and steel products; foundry and machine shop products; and cotton goods.

Mining.—T. has four distinct iron belts, the total production of iron ore being about 1,000,000 tons a year, and of pig iron over 333,000 long tons. Copper is also a very valuable mining product. The coal measures of T., comprising 21 counties, form part of the great Appalachian coal-field, their yield, which amounts to about 4,000,000 short tons a year, showing great diversity, although bituminous predominates.

Commerce and Transportation.—T., having no ports of entry, has no direct foreign trade, but it has two ports of delivery, Memphis and Nashville, for the La. custom district, and a large interior trade. The annual imports at Memphis amount to about $100,000 and at Nashville to about $50,000. The development of the railroad in the state has been steady, there being at present a total trackage of over 3,700 miles, divided among several important roads.

Finance and Banking.—The total assessed valuation of property is about $500,000,000, the tax rate $3.80 per $1,000, and the bonded debt about $10,000,000. There are about 75 national, about 150 state, and a few private banks.

Religion.—The strongest denominations are the Baptist, the Methodist Episcopal, South; the Christian, the Cumberland Presbyterian, and the Roman Catholic.

Education.—T. spends over $3,000,000 annually in the maintenance of its public schools, in which there are over 500,000 pupils enrolled, with over 10,000 teachers. There are also normal schools, private academies, and institutions of higher education, both for the whites and colored, besides co-educational colleges and universities, colleges and universities for men only, and colleges and seminaries for women only. The most prominent institutions of higher education are probably the University of T., University of the South, Vanderbilt University, and Bethel College.

History.—T. was settled by whites first by a small colony from N. C. 1754, but the settlers were soon driven away by the Indians. In 1857 another attempt to occupy the terr. was made and Fort Loudon was built on Little Tennessee river about 30 m. from the present Knoxville. The colonists were not seriously disturbed till 1760, when the Indians beseiged and captured the fort, released the whites on condition that they would return to N. C., and butchered the most of them after they had started. In 1761 a larger force, armed and comprising people from N. C. and Va., entered the district, forced the Indians into submission, made a treaty

with them, and established settlements on the Watauga and Holston rivers, under the name of the 'Watauga Association.' N. C., which claimed all the region as its own after its separation from S. C., permitted the settlements to be represented in its colonial assembly 1776, and officially called the region the 'District of Washington.' During the next 7 years the region formed a part of N. C. In 1785 the people of the settlements became dissatisfied with their treatment by N. C., formed an independent govt. under the name of 'the State of Franklin,' and maintained that organization till 1788, when they again acknowledged the jurisdiction of N. C. In the following year N. C. ceded the region to the general govt., which 1790 organized from what is now Tenn. and Ky. 'the Territory of the United States South of the Ohio.' In 1794 a part was set off as the Terr. of Tenn., and 1796 this part was admitted into the Union as a state.—In the revolutionary war the people aided the colonists of N. C., were engaged at King's Mountain and elsewhere, and defeated the Indians 1776, June. In the second war with Great Britain, the Tenn. militia, under Gen. Jackson, were early under arms, fought a bitter and successful war with the Creek Indians as a punishment for their great massacre at Fort Mims, captured Fla., and were conspicuous before and in the battle of New Orleans. In the civil war a majority of the people voted for secession, but in e. Tenn. the majority remained loyal to the Union. The state was the scene of important and almost continuous naval and milit. operations during the war. Among notable battles were those of Fort Pillow, Stone River, Island No. 10 in the Mississippi river, Forts Donelson and Henry, Nashville, Chickamauga, Lookout Mountain, Missionary Ridge, Knoxville (see these titles), and Franklin. The state was raided frequently by the Confederates 1864. In 1865, Jan., a state convention was held, which proposed amendments to the constitution annulling all acts relating to secession. The amendments were ratified by the people in Feb.; the legislature ratified the 13th amendment to the federal constitution in Apr.; the state govt. was reorganized with William G. Brownlow (q.v.) as gov.; the 14th amendment of the federal constitution was ratified by the legislature 1866, July 13; and the same month the state was re-admitted into the Union.—Tenn. has given the country three presidents, Andrew Jackson, James K. Polk, and Andrew Johnson. The constitution of 1796 was amended 1834–5, 53, 65, and 70; and the state capitals have been Knoxville 1794–1811 (excepting 1807, when it was at Kingston); Nashville 1812–15; Murfreesboro 1816 and 1819-25; Knoxville 1817; and Nashville since 1825.

Government.—The executive authority is vested by the constitution (1870) in a gov., elected for 2 years and ineligible for more than 6 years in any term of 8, salary $4,000 per annum. He must be 30 years old, a citizen of the United States, and a citizen of the state 7 years

next preceding his election; and is given the power of veto, but a bill may be passed over his veto by a majority vote of each house. He is aided by a sec. of state, elected by the general assembly in joint session for 4 years, salary $1,800 per annum and fees; by a state treas. and comptroller, each appointed by the general assembly for 2 years, salary of each $2,750 per annum; by an attorney-gen., appointed by the judges of the supreme court for 8 years, salary $3,000 per annum; and by the usual state commissioners. In case of the death, removal, resignation, or disability of the gov., the chief executive authority passes to the president of the senate.—The legislative authority is vested in a general assembly, comprising a senate of 33 members and a house of representatives of 99 members, each elected for 2 years; salary of each $4 per day and 16 cts. mileage. A senator must be 30 years old, a representative 21; both must be citizens of the United States, citizens of the state for 3 years, and residents of the counties or districts represented 1 year. The legislature meets in biennial sessions, in odd-numbered years, limit of session 75 days; and may meet in response to a proclamation by the gov., when business must be confined to matters specified in the proclamation. The right of suffrage is granted to every male person, 21 years old, who has been a resident of the state for 1 year and of the co. or district 6 months, and who has paid his poll-tax.—The judicial authority is vested in a supreme court of 5 judges, elected for 8 years by the qualified voters of the state at large—salary of each $4,000 per annum; in a circuit court, for each of the 16 judicial circuits, of one judge elected in the circuit for 8 years; in a chancery court, for each of the 12 chancery districts, of one chancellor elected in the district for 8 years; in a co. court —divided into a quarterly court and a quorum court— of one-half the justices in the co. for the quarterly court, and 3 justices appointed by the quarterly court for the quorum court; and in justices of the peace with jurisdiction in cases involving $50–$500. The supreme court has almost exclusively appellate jurisdiction; the circuit court has both original and appellate jurisdiction; and the chancery court has original jurisdiction in equity cases involving more than $50. There are also U. S. district courts, salary of judges $3,500 per annum each; and one U. S. circuit court, salary of judge $6,000 per annum. Other officials are U. S. pension agent, salary $4,000 per annum (paid out in year ending 1894, June 30, $7,721,420), and 3 U. S. collectors of internal revenue, salary $3,000 and $4,500 (collections in year ending 1894, June 30, $1,010,291). 1902, July 1, there were in T. 2,767 postoffices, of which 60 were presidential (4 first-class, 7 second-class, 49 third-class, and 2,797 fourth-class); of these 473 were money-order offices.

The successive govs., with their terms of service, are as follows:

State of Franklin.

John Sevier.....1785-88

Terr. of the U. S. s. of the Ohio.

William Blount.....1790-96

State.

John Sevier.....1796-1801
Archibald Roane.... 1801-3
John Sevier 1803-9
William Blount.....1809-15
Joseph McMinn.....1815-21
William Carroll.....1821-27
Sam Houston.....1827-29
William Carroll.....1829-35
Newton Cannon.....1835-39
James K. Polk.....1839-41
James C. Jones.....1841-45
Aaron V. Brown....1845-47
Neil S. Brown.....1847-49
William Trousdale..1849-51
William B. Campbell.1851-53
Andrew Johnson....1853-57
Isham G. Harris....1857-62
Andrew Johnson....1862-65
Wm. G. Brownlow..1865-69
De Witt C. Senter..1869-71
John C. Brown.....1871-75
James D. Porter....1875-79
Albert S. Marks....1879-81
Alvin Hawkins.....1881-83
William B. Bate....1883-87
Robert L. Taylor....1887-91
John P. Buchanan..1891-93
Peter Turney.....1893-97
Robert L. Taylor...1897-
Dehaon McMillan..1899-1903
James B. Frazier...1903-05
John I. Cox.....1906-07
M. R. Patterson...1908-09
Ben W. Hooper...1910-

Counties, Cities and Towns.—Tennessee was divided (1900) into 96 counties, James county having been abolished by the legislature 1890-91, and its territory restored to Bradley and Hamilton counties, to which it formerly belonged. The most populous cities (1910): Nashville 110,364; Memphis 131,105; Knoxville 36,346.

TENNESSEE: a river formed by the Holston from Virginia and the French Broad from North Carolina, which unite near Knoxville, Tenn. It flows s.w., entering Alabama in the n.e. part of the state, and continuing s.w. to the center of Marshall co., where it turns n.w. and flows across the n. part of Alabama, re-entering Tennessee in Harden co. From here the course of the river is nearly due n. across the state of Tennessee and the w. part of Kentucky, to the Ohio river, which it enters at Paducah, Ky. The length of the river is about 800 m.; from the source of the Holston to the mouth of the Tennessee is about 1,200 m. It is navigable, without artificial aid, to Florence, in Lauderdale co., Ala., a distance of 280 m. from Paducah. Just above Florence are the Muscle shoals, about 20 m. long, which are navigable for about one month in the spring. A canal has been built to overcome this obstruction to navigation. Above the shoals, the river is navigable for light-draft steamers nearly all the year. The navigable waters of the upper course of the river, together with the Holston, are about 930 m. The Tennessee is the largest tributary of the Ohio river. It enters the Ohio 10 m. from the mouth of the Cumberland river.

TENNESSEE, Army of the: one of the divisions of the federal army in the civil war. After the battle of Shiloh it was commanded by Gen. Halleck, and later by Grant, Sherman and others.

TENNESSEE, University of: the State University located at Knoxville, Tenn. It was established in 1794 as Blount College, a non-sectarian institution, and was incorporated by the first general assembly of the territory s.w. of the Ohio; in 1807 the name was changed to East Tennessee College, and in 1809 to East Tennessee University. In 1869 the state legislature gave to the

University the control of the congressional land grant of 1862; in 1879 it was further recognized as a state institution by an act connecting it with the public schools of the state; and in that year its name was changed to the University of Tennessee. The board of trustees consists of 30 members nominated by the board and elected by the legislature for life, from each congressional district; the governor, the secretary of state, and superintendent of public instruction are members *ex officio*. The university is coeducational. It comprises the college of agriculture and mechanic arts and the university department; the former includes (1) the agricultural department with a four years' course in agriculture, animal husbandry, dairying, horticulture and forestry, meteorology and general sciences; (2) the engineering department with four years' courses in mechanical, civil, and electrical engineering and chemistry; (3) the literary department with courses in languages and literature, general sciences, history and political economy; (4) the department of education with courses in pedagogy and methods of teaching English, history, manual training and other special subjects; (5) an industrial department in Knoxville College for colored students, with courses in agriculture, carpentering, printing, brick-making, sewing, cooking, and electrical work. The university includes (1) the academic department and department of education, with two-year graduate courses leading to the degrees of A.M. and M.S., and professional courses leading to the degrees of mechanical engineer, electrical engineer, and civil engineer; (2) the department of law, with a two years' professional course leading to the degree of LL.B.; (3) the department of medicine, with a four years' course leading to the degree of M.D.; (4) the department of dentistry, with a course leading to the degree of D.D.S. The last two departments are located at Nashville, Tenn. The literary department confers the degree of A.B. for the completion of a course including the full course in Latin or Greek; for other courses the degree of B.S. is conferred; the agricultural department and the engineering department confer the degree of B.S. in agricultural science, in civil engineering, in mechanical engineering, etc. Students in the department of education are admitted to courses in the other college departments and on the completion of a four years' course receive the degree of A.B. or B.S., according as they do or do not complete Latin or Greek. Military science and drill are a part of the curriculum and are required of the men students in the freshmen and sophomore classes. In 1902 a teachers' summer school was opened on the university grounds with the co-operation of the university authorities. Short winter courses are given in the agricultural department; and this department organizes farmers' institutes throughout the state; the state agricultural experiment station is also connected with the uni-

versity. The campus proper contains 37 acres, and the university farm contains 105 acres; there are 16 buildings including dormitories on the campus. The library contains 27,546 volumes. The students number 755 and the faculty 106.

TENNEY, *tēn'nĭ*, SAMUEL, M.D.: physician, publicist, and judge: 1748, Nov. 27—1816, Feb. 6; b. Byfield, Mass. After graduating at Harvard and studying medicine, he began practice at Exeter, N. H., joined the army as surgeon at the battle of Bunker Hill, and served till the close of the war. He had part in the constitutional convention of 1788, and wrote much for the adoption of its result; was probate judge 1793-1800; and member of congress 1800-07. For scientific journals and societies he wrote various papers. He died in Exeter.

TEN'NEY, WILLIAM JEWETT: editor and author: 1814—1883, Sept. 20; b. Newport, R. I. A graduate of Yale, 1832, he became a lawyer in New York, an editor of the *Journal of Commerce* 1841, was an editor of the *Evening Post* two years, of the *Mining Magazine*, and, 1861-82, of Appleton's *Annual Cyc.* He was councilman of Elizabeth, N. J., devised its system of schools, over the board of which he presided, was collector of the port, and two years was judge of a Brooklyn criminal court. He added the 16th vol. to Benton's abridged debates of congress, and published *Military and Naval Hist. of the Rebellion* (1865); also *Grammatical Analysis* (1866). His wife, an authoress, was dau. of Orestes A. Brownson. He died in Newark, N. J.

TENNIEL, Sir JOHN: English artist: b. London 1820; d. ————. He received no regular art training. In 1845 he was selected by open competition to paint a fresco in the house of parliament at Westminster, but he is better known as a book-illustrator and a cartoonist in *Punch*, on whose staff he worked during the 50 years 1851-1901. His cartoons are unique as contributions to a comic paper, being of classic severity in line and expression and often tinged with a tragic seriousness of meaning which exhibits their author as not only a great caricaturist but also a great painter. Yet nothing can be more powerful than the political satire which characterizes the majority of them, a satire whose geniality neither deadens the life nor blunts the point of their irresistible humor.

TENNIS, n. *tĕn'nĭs* [OE. *tennis*, to drive to and fro: perhaps from F. *tamiser;* Dut. *temsen*, to bolt or searce—affording a lively image of an object driven from one side to the other: possibly from the exclamation '*Tenez!*' employed by early French players in serving the ball]: game in which a ball is driven to and fro with rackets. TENNISCOURT, place for playing tennis. *Note.*—Skeat, suggesting a derivation from OF. *tenies*, plu. of *tenie*, L. *tænia*, says, 'We might imagine *tænia* to be used either for the band or string over which the balls are played,

or for the stroke on the wall as in rackets.'—*Tennis* is a game of great antiquity, finding its analogies in the *sphairisis* of the Greeks, and the *pila* of the Romans. Under the name *paume* (from the ball being at that time struck with the palm of the hand) it is noticed in the Arthurian romances (though not known in England in Arthur's time) and in the earlier records of the dark ages. In the 15th c., it was in great vogue in France among all classes, from the monarch down; and about this time a heavy glove to protect the hand in striking the ball was introduced, and a further improvement was subsequently effected by adoption of the *racket*. The game in England kept pace with its progress in France, and during the 16th, 17th, and 18th c. was generally practiced under the name *tennis*. Many modifications have been introduced, but the legitimate descendant of the paume and tennis of former days is the present game of rackets, played in a court 96 or 97 ft long, by 33 or 34 ft. wide, and surrounded by walls sufficiently high to prevent the balls from being lost. The players are either two in number, or four divided into two parties. The player or party 'in' *serves* the ball against the head-wall of the court, so as to rebound over a line drawn at a certain distance; it is returned by means of the racket by the player or party 'out,' who must make it rebound from the wall to the other side of the line; and the game is thus carried on till one player fails to strike the ball or causes it to rebound properly. If the player 'in' fails, he changes places with the player 'out;' if the latter fails, the former scores a point. The part of the court on which the player or party in is placed is called the 'service' side; the other, the 'hazard' side. A similar game played without the racket is called *fives*, *hand-tennis*, or *hand-ball*.

A modern adaptation of the ancient T. is the popular modern T.—more properly Lawn-tennis (q.v.).

TENNYSON, *tĕn'ĭ-son*, ALFRED, D.C.L., F.R.S., Lord: 1809—1892, Oct. 6: English poet: b. at Somersby, in Lincolnshire, where his father, the Rev. G. C. T., was rector. He was the third son in a large family, of which several other members shared in some measure the genius which has won him rank as the first English poet of his time. Very early, the bent of his nature became obvious; and 1827, T., with his brother Charles, issued a small volume, *Poems, by Two Brothers*, of whose contents little has been preserved. Having entered Trinity College, Cambridge, he gained 1829 the chancellor's medal by a poem in blank verse, *Timbuctoo*, in which there is some impress of his peculiar genius. His literary career properly dates from the appearance (1830) of a volume, *Poems, chiefly Lyrical*, by Alfred Tennyson. It was not received with great favor by the public; but amid much that was weak and immature, it contained pieces which distinctly announced the advent of a true poet. In a notice of the book by Prof. Wilson, in *Blackwood's Magazine*, the promise of the young writer was expressly recognized; but the praise was mixed with censure, which, though it seems on the whole judi-

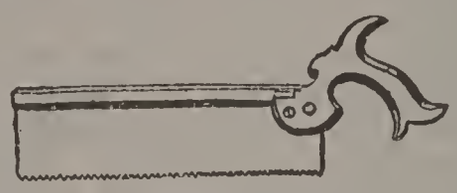
ALFRED TENNYSON.

cious, did not commend itself as such to the poet, who retaliated on 'crusty Christopher' in his next volume, 1832. This consisted of a selection of poems from the previous volume, carefully retouched by the writer, with the addition of pieces produced in the interval, many of which have scarcely been surpassed in beauty by anything that he has since produced. Onward from this time, T.'s reputation rose slowly but surely; and the publication 1842 of *Poems, by Alfred Tennyson* (2 vols.), raised him to the supremacy which he has ever since held by almost universal consent. In 1847 appeared *The Princess, a Medley;* in 1850, the series of elegies *In Memoriam, A. H.*, a tribute of affection to the memory of Arthur Hallam, son of the eminent historian, and the chosen friend of the poet in his earlier years at Cambridge. On the death of Wordsworth, 1850, T. succeeded him as poet laureate, in which capacity he issued, 1852, his *Ode on the Death of the Duke of Wellington.* In 1855 appeared *Maud, and other Poems.* The immediate reception of this little volume was not enthusiastic. While many of its lyrics instantly caught the public ear, *Maud*, as a whole, at first puzzled the critics, and was little better than 'caviare to the general;' and though it has since risen in estimation, the subtle and recondite art in the structure of the poem is probably even now appreciated by only a few of its admirers. But for any little falling off in T.'s popularity on this occasion, a noble amend was made him on his next appearance: *The Idylls of the King* (1859) were received with general enthusiasm. With scarce a whisper of dissent, this work at once took rank as one of the noblest poems in our language. It was followed 1864 by a volume, containing *Enoch Arden*, one of his most finished and successful works; *Aylmer's Field;* a short piece, *Tithonus*, consummate in beauty and finish; and a few other less elaborate poems; one of which, however, *The Northern Farmer*, in the Lincolnshire dialect, is singularly striking. Since then, T. has produced several new *Idylls*, which may be considered to complete the Arthurian cycle: *The Holy Grail* and *Pelleas and Ettarre* (1869); and *Gareth and Lynette*, and the *Tournament* (1872). *The Window* appeared 1870; *Lover's Tale*, 1879; *Ballads*, 1880; and *Tiresias*, 1885. In 1875 T. published his first drama, *Queen Mary*, followed by *Harold* in 1876; *The Falcon* was acted 1879; *The Cup*, 1881; *The Promise of May*, 1882; and a drama based on the life of *Becket*, 1884. Recent collected editions arrange the various *Idylls of the King* in their proper sequence in the legend of Arthur, and enable the reader to appreciate the beauty and significance of the ideal story. Other publications are, *Locksley Hall Sixty Years After* (1886); *Jubilee Ode* (1887); *Demeter* (1889); and *To the Mourners*, an ode on the death of Prince Albert Victor, heir presumptive to the throne (1892). *The Foresters*, a beautiful and characteristic version of the Robin Hood legend, appeared 1892, and contains much that appeals potently to the English sense of patriotism. *In Memoriam* touches the soul of all humanity. Lord T.'s biography, even more than that of most authors, is given,

so far as the public is concerned with it, in the simple enumeration of his works. He lived mostly a retired life in the Isle of Wight, or at Aldworth in Surrey. He was raised to the peerage 1883 under the title Baron Tennyson of Aldworth in the county of Surrey, and of Freshwater in the Isle of Wight. He was buried in the Poets' Corner. near Chaucer, in Westminster Abbey.

T.'s verse is the most faultless in our language, both for the music of its flow and the art displayed in the choice of words. As a painter in words no modern poet has equalled him. But neither to his music nor to his coloring alone is due his great popularity. His *virtue* as a poet doubtless lies in these things; but the pleasure which his poetry gives springs largely from the cordial interest that he reveals in the life and pursuits of men, in his capacity for apprehending their higher and more beautiful aspirations, and in a certain pervasive purity and strength of spiritual feeling.

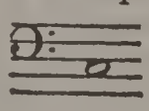
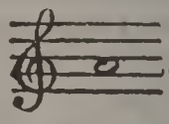
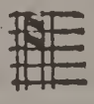
TENON, n. *tĕn'ŏn* [F. *tenon*, a projection made to fit into a mortise—from F. *tenir;* L. *tenērĕ*, to hold]: in



Tenon-saw.

carpentry, the end of a piece of timber reduced in thickness, cut often to the form of an inverted wedge and received into a cavity in another piece, called a *mortise*, in order to form a secure joint: V. to form a tenon or tenons in. TEN'ONING, imp. TEN'ONED, pp. *-ŏnd.* TENON-SAW, a saw with a brass or steel back for cutting tenons.

TENOR n. *tĕn'ĕr* [L. *tenor*, an uninterrupted course, sense, tenor—from *tenĕō*, I hold: It. *tenore:* F. *teneur*]: general or prevailing course, direction, or drift; character; stamp; purport; sense contained.

TENOR, n. *tĕn'ĕr* [same as TENOR 1, so called from the notion of holding or sustaining the dominant note: It. *tenore;* F. *ténor*, tenor]: one of the four classes into which voices can be divided in respect of their compass; the middle part next above the base in a piece of music arranged for four voices; the highest variety of the ordinary male voice; the person who sings the tenor, or the instrument that plays it: ADJ. pert. to the tenor.—*Tenor* generally extends from  to  . Music for tenor voices is most properly written on the tenor or C clef  in which its principal tones come within the staff; but the treble clef is occasionally used, with the notes written an octave above their true pitch.

TENOTOMY, n. *tĕ-nŏt'ō-mĭ* [Gr. *tenōn,* a tendon; *tomê, a cutting*]: in *surg.,* operation of dividing a tendon; a comparatively recent surgical operation, to relieve some variety of deformity by severing a permanently contracted muscle at its tendinous portion. The invention of subcutaneous tenotomy is due to Stromeyer (1831). The various kinds of knives devised for severing tendons are termed *tenotomes.* The affections in which tenotomy is advantageously employed are club-foot, contractions of the upper extremity from spasm and paralysis, deformity from diseases of the palmar fascia, torticollis or wry-neck, anchylosis of the knee and other articulation, and squinting.

TENPINS, n. *tĕn'pĭnz:* game popular in the United States, played on a long, narrow, smooth bowling-alley, by aiming large round bowls or balls (see BOWL) to knock over the 'pins' or pieces of wood set up on end.

TEN'SAS: a river in the southeastern part of Alabama, the eastern channel through which the united waters of the Tombigbee and the Alabama rivers pass to Mobile Bay. The western chanel is called Mobile river. At the mouth of the Tensas is Fort Blakely, where took place an engagement between the Union forces and the Confederates, 1865, March 25.

TENSE, a. *tĕns* [L. *tensus,* drawn tight, pp. of *tendo,* I stretch]: drawn tight; stretched; rigid. TENSE'LY, ad. *-lĭ.* TENSE'NESS, n. *-nĕs,* state of being stretched to stiffness. TENSION, n. *tĕn'shŭn* [F.—L.]: the act of stretching or straining; state of being stretched to stiffness; the strain in the direction of the length which a body can bear; the force with which electricity accumulated on the surface of a body tends to escape. TENS'IBLE, a. *-ĭ-bl,* or TENS'ILE, a. *-ĭl,* capable of extension. TENS'IVE, a. *-iv,* giving the sensation of tension or contraction. TENS'IVELY, ad. *-lĭ.* TENS'ITY, n. *-ĭ-tĭ,* state of being tense. TENS'OR, n. *-ėr,* in *anat.,* a muscle that extends or tightens a part. TENSION-ROD, an iron rod applied to strengthen timber or metal framing.

TENSE, n. *tĕns* [OF. *tens;* F. *temps,* time—from L. *tempus,* time]: in *grammar,* time; that form or modification of the verb by which time is expressed, e.g., the present *tense,* the future *tense:* see CONJUGATION.

TENSOR, n. *tĕn'sėr* [L. *tensus,* pp. of *tendo,* I stretch]: in *anat.,* any muscle which stretches the part on which it specially operates.

TENT, n. *tĕnt* [F. *tente,* lint—from L. *tentārĕ,* to feel, to probe: Sp. *tienta;* It. *tenta,* a surgeon's probe]: in *surg.,* a plug of lint used to dilate or keep open a wound: V. to search a wound; to keep it open with a tent. TENT'ING., imp. TENT'ED, pp.

TENT, v. *tĕnt* [F. *attendre,* to attend to, to expect, to wait for—from L. *attendĕrĕ,* to attend to]: in *OE.* and *Scot.,* to take heed; watch: N. attention; care; heed.

TENT, n. *tĕnt* [F. *tente*, a tent—from mid. L. *tenta*, a cloth stretched, a tent; L. *tentōrĭum*, a tent—from *tendĕrĕ*, to stretch, to spread: It. *tenda*, any cloth to hang before a window to keep off the sun]: a pavilion or place of shelter formed of canvas, coarse cloth, skins, or the like, stretched on, and sustained by poles, or upon a light timber frame: V. to lodge, as in a tent. TENT'ING, imp.: N. canvas for tents. TENT'ED, pp.: ADJ. furnished with tents, as soldiers; covered with tents, as a field. TENT'LESS, a. *-lĕs*, having no tents. TENT-BED, a bedstead having curtains or hangings stretched over it like a tent.—The *Tent* was doubtless one of the earliest forms of dwellings—among nomadic tribes a primary necessity. The skins of animals, or the larger kinds of foliage, would form the earliest coverings; for which textile fabrics would be substituted as civilization advanced. In the book of Genesis, the patriarchs, Noah, Abraham, Lot, Isaac, Jacob, are represented as dwelling in tents, probably much the same as the modern Arab tents, which are large structures, very rude in form, covering

Fig. 1.—Arab Tent.

considerable ground, but of small height. Among the Nineveh sculptures is a representation of the T. of the King Sennacherib, which, like modern tents, was supported by ropes; numerous tents of the officers and common people are likewise shown.

The early Greek, and afterward the Macedonian tents were small coverings of skins, under each of which two soldiers slept. Alexander the Great is said to have had a pavilion of extraordinary magnificence: its roof, one mass of gilded embroidery, was sustained by eight pillars covered with gold. In the centre, was the royal throne; and 100 beds could be made up within the temporary edifice.

The Roman soldiers seem to have used two sorts of tents—one, a T. proper, of canvas or like material, with

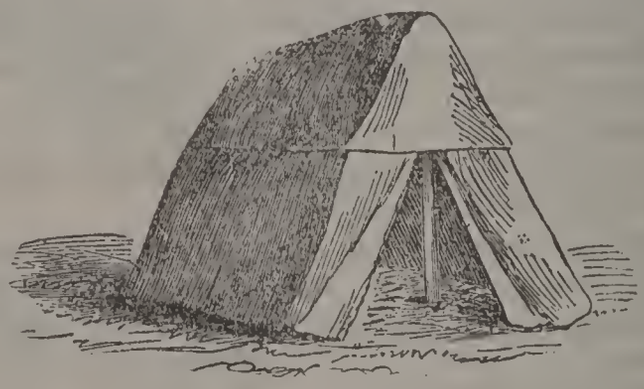


Fig. 2.—Roman Tent.

two solid upright poles, and a roof-piece between them; the other, more resembling a light hut, of a wooden skele

ton, covered by bark, hides, mud, straw, or any material which afforded warmth. Of these tents, the poles of the first would have been too cumbrous for carriage, and were probably cut afresh at each halting-place; the latter was evidently unsuited to removal, and was erected probably only for winter-quarters or a long sojourn. The Roman T. held 10 soldiers, with their *decanus*, or corporal.

In Persia are many tribes who dwell constantly in tents, which, naturally, they have brought to considerable perfection. They make them nearly hemispherical, with a wooden framework, and covered with felt, while worked hangings close the aperture. This felt admits of much taste in decoration.

The nomadic Mongols live in tents, which are cleverly

Fig. 3.—Mongol Tent.

constructed, of great size, and affording considerable comfort.

Modern military tents are of linen or cotton canvas, sup-

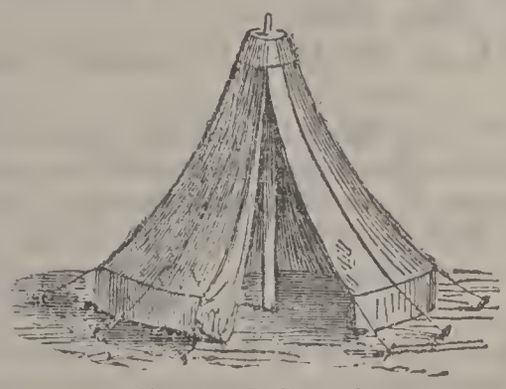


Fig. 4.—Bell-tent.

ported by one or more poles according to shape, and held extended by pegs driven into the ground. British tents comprise the hospital-marquee, a large oblong tent with high side-walls; and the round-tent, or bell-tent for troops.

Milit. tents in the United States comprise the hospital-tent, wall-tent, wedge-tent, a modification of the French shelter-tent, and the poncho-tent. All are of white duck, except the poncho, which is of rubber. The hospital-tent is 15 ft. sq., 12 ft. high to ridge, and 4½ ft. in height of walls: it is open at both ends so that several may be erected together to form a continuous ward, and accommodates 6 to 8 beds. The wall-tent, 9 ft. sq., 8½ ft. high to ridge, with walls 3 ft. 9 in. high, and fly, is for officers; the wedge or common tent, 6 ft. 10 in. high, 8 ft. 4 in. wide, 6 ft. 10 in. long, is for enlisted men, and accommodates 6;

the shelter-tent consists of two pieces of duck 5 ft. 6 in. by 5 ft. 5 in., buttoned together and stretched over a ridge pole; and the poncho is a sheet about 6 ft. sq., with a slit in the centre through which the soldier puts his head—several such sheets united form the tent. The old Sibley tent, very similar to the Sioux lodge, formerly popular in the army, was discontinued during the civil war.

TENTACLE, n. *tĕn'tă-kl*, usually in the plu. TEN'TACLES, *-klz*, or TENTACULA, n. plu. *tĕn-tăk'ū-lă* [F. *tentacule* a feeler, or one of the antennæ of insects—from new L. *tentac'ŭlum*, a feeler—from L. *tentārĕ*, to touch]: one of the slender flexible organs possessed by many of the lower animals, e.g., snails, insects, crabs, cuttle-fish, etc.; and used for feeling, exploring, prehension, locomotion, or for attachment to other bodies; a feeler. TENTAC'ULAR, a. *-lĕr*, pert. to tentacula or feelers. TENTAC'ULATE, a. *-lāt*, or TENTAC'ULATED, a. having tentacles. TENTAC'ULIF'EROUS, a. *-lĭf'ĕr-ŭs* [L. *fero*, I bear]: having or bearing tentacles. TENTAC'ULITES, genus of small annulated tapering shells, abundant in some strata of Silurian age, the structure of the shell showing great affinities to pteropodous mollusks, among which tentaculites are now classed. The form of the shell is a long, sharp cone, and the remains abound especially in the Tentaculite Limestone of the Water-lime group near the top of the Silurian series in N. Y.

TENTATION, n. *tĕn-tā'shŭn* [F. *tentation*, temptation—from L. *tentātĭō* or *tentātĭōnem*, trial, proof—from *tentāre*, to try]: in *OE.*, trial; temptation.

TENTATIVE, a. *tĕn'tă-tĭv* [L. *tentārĕ*, to try]: experimental.

TENTER, n. *tĕn'tĕr* [L. *tentus*, pp. of *tendĕrĕ*, to stretch]: a machine for stretching cloth by means of hooks, called *tenter-hooks:* V. to hang or stretch on tenters. TEN'TERING, imp. TEN'TERED, pp. *-tĕrd*. TO BE ON TENTER-HOOKS, to be on the rack; to be in a state of suspense or anxiety.

TENTER, n. *tĕn'tĕr* [from TENT 2]: one who tends or superintends something, such as the proper working of a machine or machines by others.

TENTERDEN, *tĕn'tĕr-dĕn:* municipal borough and market-town in the weald of Kent, England; 18 m. s.s.e of Maidstone. The church, which contains portions of Early English, is surmounted by a massive and lofty perpendicular tower. Tradition asserts that a quantity of stones which had been gathered for strengthening the sea-wall of the Goodwin Sands were used in building this tower; and that, when the next storm came, the tract of Goodwin Sands, formerly joined to the mainland, was submerged: thus arose the popular saying that 'Tenterden steeple was the cause of the Goodwin Sands.'—Pop. (1901) 3,243.

TEN'TERDEN, CHARLES ABBOTT, Lord: English lawyer: 1762, Oct. 7—1832, Nov. 4; b. Canterbury. He studied at the King's School connected with the cathedral, and received aid to proceed to Oxford, where at Corpus Christi College he graduated with the chief distinctions at the university. After being a student of the Inner Temple 1795, he was called to the bar; and in spite of a husky voice, a leaden countenance, and painfully timid manners, his great activity of mind, good taste, scholarship, scientific and legal knowledge, soon gave him a large business. He published 1802 his treatise *On Merchant Ships and Seamen.* In 1807 his fees were more than £8,000. In 1816 he was appointed a judge; was knighted 1818, and chosen to succeed Lord Ellenborough as chief-justice of the king's bench; and 1827 was raised to the peerage. In the house of lords he vigorously opposed the Rom Cath. Relief Bill; and in his last speech he made a vow that if the Reform Bill, that 'appalling bill,' passed, he would never again take his seat as a peer. The success of the measure, it is believed, affected his health, and soon afterward he died.

TEN THOU'SAND, RETREAT OF THE: return to Europe of the Greek mercenaries who were in the expedition of the younger Cyrus against his bro. Artaxerxes II. of Persia. The retreat—described by Xenophon, the Greek historian, in the *Anabasis*—began B.C. 401, after the battle of Cunaxa, when the Greek commanders were assassinated by order of Tissaphernes. The retreat was conducted by Xenophon, who was with the army as a sort of 'volunteer aide' to Proxenus, one of the Greek generals, and as a seeker of novelty and adventure. But by Xenophon's prudence and skill, the Grecian host was in 5 months conducted safely to the shores of the Bosporus, after a march of more than 1,000 m., everywhere beset by enemies, and confronted by hardship. See XENOPHON.

TENTH, TENTHLY: see under TEN.

TENTORIUM, n. *tĕn-tō'rĭ-ŭm* [L. *tentōrĭum*, a tent—from *tendo*, I stretch]: in *anat*, a projection of the dura-mater, separating cerebrum from cerebellum.

TEN TRIBES: people of the kingdom of Israel as distinguished from the kingdom of Judah: see JEWS.

TENT-WINE, n *tĕnt-wīn* [Sp. *tinto*, deep-red—from L. *tinctus*, pp. of *tingĕrĕ*, to stain]: a kind of Spanish wine, used for sacramental purposes.

TENUIROSTRES, n. plu. *tĕn'ū-i-rŏs'trēz* [L. *tenŭis*, slender; *rostrum*, a beak]: in obsolete classification, a very unnatural group of the order *Insessores* or perching birds, characterized by long slender beaks, some straight and some curved. Some feed on insects, some chiefly on the honey of flowers. To this tribe belong the Creepers (*Certhiadæ*), Sun-birds (*Cinnyridæ*), Humming-birds (*Trochilidæ*), and Hoopoes (*Upupidæ*), now distributed, like the old equally artifical groups *Dentirostres*, etc., according to their true affinities. TENUIROSTRAL, a. *-rŏs'trăl*, slender-beaked; pertaining to the tenuirostres.

TENUITY, n. *tĕ-nū'ĭ-tĭ* [F. *ténuité*—from L. *tenuĭtas* or *tenuĭtātem*, thinness—from *tenŭis*, thin or slender: It. *tenuita*]: thinness; slenderness rarity, as of the air; lightness; simplicity or bareness, as of style. TENUOUS, a. *tĕn'ū-ŭs*, thin; slender; rare, as the air. TEN'UOUSLY, ad. *-lĭ*.

TENURE, n. *tĕn'ūr* [F. *tenure*, a tenure—from *tenir*; L. *tenēre*, to hold]: a holding; the conditions under which a tenement is held; holding or manner of holding real estate. manner of holding in general. TENURE OF LAND, anciently in England and the greater part of Europe, an accompaniment or immediate consequence of the Feudal System (q.v.) established during the middle ages. The feudal system was extended to England by the Norman barons soon after the Conquest, with concurrence of William I., much to the dislike of the Saxons, whose grievances grew until they found vent in Magna Charta, which was in fact an attempt to restore their earlier constitution. The chief fiction, however, of a relation between the crown and the holders of land, was not abolished. The crown was nominally the lord paramount, and there were intermediate lords called mesne lords, of whom the tenants held. Gradual changes have ensued, with the result that in England at the present day the two tenures are freehold and copyhold. The leading characteristic of freehold is that practically the feudal relation between the crown and the holder is cut off, and the holder is entirely his own lord and master, can sell the estate, devise it by will, give it away, and do what he likes with it, free from any interference or payment to the crown. In copyhold, the feudal relation is kept up to a certain extent between the lord and the copyhold tenants, who must in form pay rents more or less nominal, and fines and Heriots (q.v.) to the lord on alienating the lands or succeeding thereto. Yet, practically, the copyholder does not materially differ from a freeholder except that he is liable to these petty and harassing acknowledgments toward a stranger; and by recent statutes he can compel the lord of the manor to commute these fines and incidents, and convert the tenure into freehold.

In Ireland the tenure of land is almost identical with that in England; but see TENANT RIGHT.

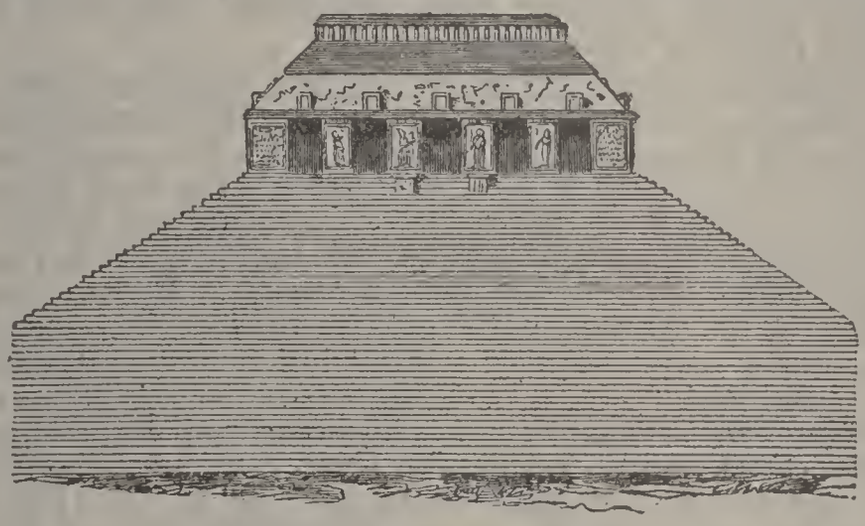
In Scotland the feudal principle is still operative to a great extent, resembling in many respects the Eng. copyhold tenure. Every piece of land there has generally its lord or superior and its vassal, that is to say, the vassal has the *dominium utile*, or actual enjoyment, while the superior has a kind of superior interest, or *dominium directum*, which consists in his drawing a rent called a feu-duty, which the vassal is bound to pay, or to forfeit the land. Recent statutes have modified the system in some details. But besides this feudal relation between the crown and its vassals, the vassals may subdivide the property and create intermediate estates without limit, each vassal being in turn the superior to his subvassal; and this endless chain

of relationships grievously complicates the conveyancing see CONVEYANCING.

On Land Tenure in general, see FEUDAL SYSTEM: FEUDFEE, ESTATE IN: ALLODIUM: FREEHOLD, ESTATE OF: SOCAGE: ENTAIL: DEMESNE: COPYHOLD: ESTATE: REAL ESTATE: LANDED PROPERTY: ETC.

TENUTO, a. *tā-nō'tō* [It., held]: in *mus.*, a term applied to a note or series of notes having to be held or kept sounding the full time.

TEOCALLI, n. *tē'ō-kăl'lĭ* [Mexican, God's house]: a pyramid for the worship of the gods among the anc. Mexicans and some other aborigines of America. Many of these structures remain, more or less ruined. They were in the form of four-sided pyramids, usually of two, three, or more stories or terraces; with the temple, properly so-called, upon a platform on the summit. The largest and most celebrated is the pyramid of Cholula, measuring 1,440 ft. each way, and 177 in height; it is much defaced,



Teocalli at Palenque, Yucatan.

and the temple on its summit has been removed. The teocallis in Yucatan are in far better preservation; they are not generally built in terraces, but rise at an angle of 45° to the level of the platform, with an unbroken series of steps from base to summit. The temples on their summit are sometimes ornamented with bas-reliefs in stucco and hieroglyphic tablets, and the roof is formed by courses of stone approaching each other, and furnished with projections like dormer windows. Like the teocallis are the palaces of the Aztec kings or chiefs, but having the pyramid smaller, less prominent, and oblong in plan; while the building, larger and more elaborate, consists mostly of a stone basement, with square doorways, but without windows, surmounted by a structure which seems directly copied from wood-work. On some of these façades are also rude pillars and grotesque carvings, and often there are chambers in the interior. A palace and temple are sometimes found attached; and in a few cases (the most remarkable the Casa de las Monjas, at Uxmal) the building are arranged round a courtyard. See MEXICO.

TEPAL, n. *tĕp'al* [altered from *petal*, and with a reference to *sepal*]: in *bot.*, a petal; one of the portions of a perianth.

TEPEE, n. *tē-pē':* American-Indian wigwam or tent.

TEPEFY, v. *tĕp'ĕ-fī* [L. *tepĕfac'ĕrĕ*, to make moderately warm—from *tepērĕ*, to be tepid; *facĭō*, I make]: to make or become moderately warm. TEP'EFYING, imp. TEP'EFIED, pp. *-fīd.*

TEPIC, *tĕp-ĭk'* or *tā-pēk':* town of Mexico, state of Jalisco; on a height 400 m. n.w. of the city of Mexico. T. is the residence, during the rainy season of many of the inhabitants of the port of San Blas, about 25 m. distant. Pop. 10,000.

TEPID, a. *tĕp'ĭd* [L. *tepĭdus*, moderately warm—from *tepērĕ*, to be moderately warm: It. *tepido*]: moderately warm; lukewarm. TEP'IDNESS, n. *-nĕs*, or TEPIDITY, n. *tĕ-pĭd'ĭ-tĭ*, moderate warmth; lukewarmness. TEPIDARIUM, n. *tĕp'ĭ-dā'rĭ-ŭm* [L.]: in the *anc. Roman baths*, the apartment in which the tepid bath was placed; the boiler in which the water was warmed.

TEPLITZ, *tĕp'lĭts*, or TÖPLITZ, *töp'lĭts:* watering-place of n. Bohemia, one of the most celebrated of the German spas; pleasantly situated on the Saubach (Pig's Stream), 16 m. n.w. of Leitmeritz, 30 m. s. of Dresden. The chief building is the palace of Prince Clary, to whom the town in great part belongs; and behind this building are a park and gardens, the principal places of resort. Within their limits are the theatre and the Gartensaal, the latter a reading, dining, and ball room. On the hill, behind the palace is the Schalckenburg, a sort of tavern, built in imitation of a castle, and commanding a wide view from its prospect-tower. The baths are supplied from 11 hot alkalo-saline springs, whose temperature ranges from 90° to 117° F. They are taken (bath or drink) exceedingly hot, and have great remedial virtue in gout, rheumatism, etc.—Pop. of T. with the adjoining village Schönau, about 16,750. About 10,000 strangers annually visit the baths.

TER, *tĕr* [L. *ter*, thrice—from *tres*, three]: a prefix in many chemical and other scientific terms, meaning 'thrice in the third degree.

TERACHITES, n. plu. *tē'rā-kīts:* immediate descendants of *Terah* through Abraham, Nahor, and Haran; e.g., the Israelites, the Ishmaelites, the Midianites, and the Ammonites.

TERAMO, *tĕr'â-mō* or *tā'râ-mō* (anc. *Interamna*): town of s. Italy, in the province of T., at the junction of the Tordina and Vezzola, 28 m. n.e. of Aquila, 12 m. from the coast; 876 ft. above sea-level. It is well built, with long and rather wide streets, has a cathedral, a public library, a foundling-hospital, and a botanic garden; and has active trade in corn, wine, and olives. Pop. (1881) 8,634; with suburbs, 13,988; (1892) 21,000; (1901) 24,563.

Ancient *Interamna* (of which the name T. is an Italianized form) was a city of Picenum, in the territory of the

Prætutii. In the middle ages, it bore the name also of Abrutium or Aprutium (supposed corruption of Prætutii), whence the modern name of the dist., Abruzzo. Vestiges of the ancient city—the amphitheatre, temples, baths, aqueducts, etc.—are traceable, and many statues, altars, and inscriptions have been discovered. In the plain below T. 1460, July 27, was one of the bloodiest battles ever fought in Italy, between the army of John, Duke of Anjou, and the Milanese allies of Ferdinand I, of Aragon. After the contest at Castelfidardo (1860), T. was the first Neapolitan city that opened its gates and gave joyful welcome to King Victor Emmanuel. Pop. of province (1901) 307,444.

TERAPH, n. *tĕr'ăf;* usually in plu. TERAPHIM, *tĕr'ă-fĭm*, or TER'APHIN, *-fĭn* [Heb. *teraphim*, nourishers—but the etymology is obscure]: in the Old Test., tutelary household idols with probably something of a human figure, by whose worship families expected to be rewarded with domestic prosperity. They were employed, seemingly in connection with divination, both in the family and in public. The gods or images which Rachel stole from her father are called Teraphim, and Saul was reproached by Samuel for stubbornness which is like Teraphim; Saul's daughter placed a Teraph in David's bed to conceal his flight, etc. Such use of Teraphim seems to have been held not incompatible with the worship of Jehovah, but resort to them was strongly condemned by the prophets.—See Judges xvii. 5; Hosea iii. 4; Gen. xxxi. 19, 30; Zech. x. 2; I Sam. xv. 23; xix. 13; II K. xxiii. 24.

TERAPIN: see TERRAPIN.

TERATOLITE, n. *tĕr-ăt'ŏ-līt* [Gr. *terăta*, signs or wonders; *lithos*, a stone]: a mineral of a pale-violet or bluish-gray color, often with reddish-white veins or spots; the *Ter'ra mirac'ulōsa Saxon'iæ* [L. the miraculous earth of Saxony] of old authors, much valued on account of its supposed medicinal properties.

TERATOLOGY, n. *tĕr'ă-tŏl'ŏ-jĭ* [Gr. *terăta*, signs or wonders; *logos*, a discourse]: branch of physiology which treats of malformations and monstrosities in animals or plants: see MONSTROSITY.

TERBIA, n. *tĕr'bĭ-ă:* a supposed metallic oxide of the supposed metallic base TER'BIUM, n. *-bĭ-ŭm;* a very rare mineral, a compound of *erbia* and *yttria:* see YTTRIUM.

TERBURGH, *tĕr'bĕrg*, GERHARD: Dutch subject-painter: 1608–81; b. Zwolle, Holland; of an old and respectable family. He studied first under his father, an artist of note, and afterward visited Germany, Italy, Spain, England, and France, painting in Paris, Münster, and Madrid. Returning to Holland, he settled at Deventer, of which town he became burgomaster. The elegant ostentatious life of his time, with its superfine courtly manners, and splendid costume, found in T. an admirable painter. The central figure in many of his pictures is a young lady with fair hair, and dressed in white satin. His most famous piece is a picture containing portraits of the 69 plenipotentiaries who drew up the treaty of Westphalia. T. is

notable for delicacy of execution, and a certain tender fusing of the colors; he excels also in the aërial perspective. His figures are well drawn, and have refinement and frequent grace. T.'s works are in many Eng. collections, and in the galleries of Dresden, Munich, Berlin, Vienna, Amsterdam, and the Louvre.

TERCE, n. *tĕrs* [F. *tierce*, a third—from L. *tertĭus*, third—from *ter*, thrice]: a third part; a cask containing 42 gallons, so called from its being the *third* part of a pipe or butt: spelled also TIERCE, *tĕrs:* in *Scots law*, a *widow's terce* is her liferent of *one-third* of the whole heritage in which her husband was infeft; but she has no *terce* of superiorities, feu-duties, leases, etc. (see DOWER): the office of the third canonical hour, one of the 'Lesser Hours' in the Roman Breviary; said at about 9 A.M. (see CANONICAL HOURS). TERCED, a. *tĕrst*, vested in her *terce*, as a widow.

TERCEIRA, *tĕr-sā-ē'râ:* one of the Azores Islands (q.v.), second in size, and one of the central cluster; e. from San Jorge; 162 sq. m. Steep rocks of lava line almost the whole coast; the island is accessible only at few places, and these are defended by fortifications. The soil is fertile; the plateaux of the mountains afford excellent pastures, and cattle-breeding is an important industry. Principal articles of export are wine, timber, and orchil. Chief town of the island, Angra, the cap. pop. (1887) 14,000. The gov. and the bp. of the Azores reside at Angra, in the fort. —Pop. of island (1887) 46,528.

TERCEL GENTLE: see under TASSEL 2.

TERCENTENARY, n. *tĕr-sĕn'tē-nā-rĭ* [L. *ter*, thrice, and Eng. *centenary*]: a day commemorative of some important event, etc., which took place three hundred years before.

TERCET, n. *tĕrs'ĕt* [F.—from *tiers*, third]: in *mus.*, a third; in *poetry*, a group of three rhyming lines; a triplet.

TERCINE, n. *tĕr'sĭn* [F.—from L. *tertĭus*, third]: in *bot.*, the third coat of the ovule, covering the central nucleus; really a layer of the primine or secundine.

TEREBENTHENE, n. *tĕr'ĕ-bĕn'thēn* [from TEREBINTH, which see]: a hydrocarbon found in oil of turpentine.

TEREBINTA'CEÆ: see ANACARDIACEÆ.

TEREBINTH, n. *tĕr'ĕ-bĭnth* [L. *terebin'thus;* Gr. *terebin'thos*, the terebinth]: the turpentine-tree; the *Pistăcĭa terebin'thus*, ord. *Anacardiăcĕæ*, native of s. Europe and n. Africa, yields a liquid resinous exudation known as Chian and Cyprian turpentine. TER'EBIN'THINE, a. *-bĭn'thĭn*, pertaining to turpentine, or resembling it in taste or other qualities; also TER'EBIN'THINATE, a. *-thĭn-āt:* N. a medicine or application consisting of true turpentine, or turpentine of the firs.

TEREBRANTIA, *tĕr-ē-brăn'shĭ-a:* section of the insect order *Hymenoptera*, distinguished by the females having an ovipositor: to this section belong Sawflies (*Tenthredinidæ*), Ichneumons, Gall-insects, etc.

TEREBRATE, v. *tĕr'ĕ-brāt* [L. *tĕrĕbra*, an instr. for boring—from *tero*, I wear]: to perforate, as with a gimlet; to bore. TER'EBRATING, imp. TER'EBRATED, pp.

TEREBRATULA, n. *tĕr'ĕ-brăt'ū-lă* [dim. of L. *terĕbrātus*, bored or perforated, in allusion to the perforation of the beak—pp. of *terĕbrārĕ*, to bore—from *tĕrĕbra*, a borer]: a genus of deep-sea brachiopod bivalves found fossil, of which all the species are extinct. In nearly allied living forms the animal is attached to the shell by a pedicle, and the brachial disk is three-lobed, the centre lobe being elongated and spirally convoluted. The shell is smooth, with truncated perforated beak, the foramen being circular. The shelly loop is very short and simple. The shell of this genus and some of its allies is covered with minute quincuncial perforations, sometimes visible to the naked eye, but usually requiring a lens of low power to distinguish them. The generic title is now restricted to shells with a short internal loop. The species with long loops are grouped together under the name *Waldheimia*. The fossil species are numerous, and are found from the Devonian age upward. The genus gives name to the most extensive family of brachiopods, represented in both extinct and recent species, the *Terebratulidæ*.

TEREDO, n. *tĕr-ē'dō* [L. *tĕrēdo;* Gr. *tĕrēdōn*, a worm which gnaws wood, clothes, etc.—from L. *tero;* Gr. *teirō*, I rub, I grind]: marine mollusk, elongated and worm-like, lodged in a somewhat globular shell at the inner extremity of a tubular burrow partly or entirely lined with shell, very destructive from its habit of boring into and taking up its lodgment in wood; *Tĕrēdo navālis* is the shipworm. TEREDINES, n. plu. *tĕr-ē'dĭ-nēz*, the borers; the teredos.—*Teredo* is a genus of lamellibranchiate mollusks of family

Common Shipworm (*Teredo navalis*).

Pholadidæ; very much elongated, and worm-shaped; mouth very delicate, open in front and at its lower part for the passage of the short foot; shell rather thick, equivalve, destitute of hinge, gaping at both ends. The species are numerous, and are generally known as SHIPWORM or PILEWORM, because they perforate and live in timber. Their perforations are in the direction of the grain of the timber, except when a knot is met, or the shell of another *Teredo*, when they accommodate themselves by bending:

the cavity is lined with calcareous incrustation. The aperture by which the teredo enters is small, and it grows within the cavity which it makes. Two small valves form the true bivalve shell; the calcareous tube incloses the worm-shaped body of the animal. Its growth is very rapid, and its ravages are often terrible. A piece of deal has been found riddled by shipworms after 40 days' immersion. Ships, piles, and all submarine wood-work are destroyed by it. Copper-sheathing is employed to protect ships from the shipworm, or the timber is driven full of short broad-headed nails, the rusting of which forms a coating which it does not penetrate. The dikes of Holland have been threatened with destruction by its ravages. The COMMON SHIPWORM (*T. navalis*), said to have been introduced from warmer seas, is now extremely abundant in European seas; and *T. megotara* in the Atlantic extends from Massachusetts to South Carolina. In the East Indies, a very large species (*T. gigantea*) is found.

TERENCE, *tĕr'ėnss* (PUBLIUS TERENTIUS AFER, *pŭb'lĭ-ŭs tē-rĕn'shĭ-ŭs ā'fėr*): Roman comic poet: B.C. 185 (?)—B.C. 159; was b. at Carthage. By birth or purchase, he became the slave of the Roman senator P. Terentius Lucanus, who, out of regard to his handsome person and unusual talents, educated him highly, and finally manumitted him. On his manumission, he assumed, of course, his patron's *nomen*, Terentius. His talent was precocious; and his first play was the *Andria*, written about B.C. 166. Its success was immediate, and introduced its author to the most refined society of Rome, where his engaging address and accomplishments made him a favorite. His chief patrons were Lælius and the younger Scipio, after living with whom in great intimacy in Rome, he went in B.C. 160 to Greece, where he made translations of many of Menander's comedies. In the following year he died, while on the point of returning home. The cause of his untimely death is uncertain. Six comedies are extant under the name of Terence, which are perhaps all he produced—viz., *Andria, Hecyra, Heautontimoroumenos, Eunuchus, Phormio,* and *Adelphi.* Terence reproduced the manners and modes of thought presented by the writers of the New Comedy of Athens a century before his time. Thus he can scarcely be deemed a creative genius; but his artistic and critical genius is certainly of the highest order. In conjunction with Plautus, Terence, on the revival of letters, was studied as a model by the most accomplished play-writers. His language is pure almost to being immaculate; and though inferior to Plautus in comic power, he is more than his match in consistency of plot and character, in tenderness, in wit, and in metrical skill. His plays have an educational value, as dividing, with the works of Cicero and Cæsar, the honor of being written in the purest Latin. They have been translated into most of the European languages. The best editions

of his works are those of Bentley (1726), Umpfenbach (Berlin 1870), and Dziatzko (Leipzig 1884). Ashmore's (N. Y. 1908) is a useful annotated edition. There are many good editions of the single plays, e.g.: *Andria,* Spengel (Berlin 1888), Fairclough (Boston 1901); *Phormio,* Elmer (Boston 1895), Dziatzko and Hauler (Leipzig 1898); *Adelphoe,* Spengel (Berlin 1879), Dziatzko and Kauer (Leipzig 1903). The best verse translation is by George Colman. This is published with Riley's prose translation by Harper (New York 1893).

TERESA (or THERESA), *tė-rē'sa* or *tā-rā'sâ,* SAINT: one of the most remarkable of the female saints of the modern Roman calendar, and the most admired of the modern mystic writers of that communion: 1515, Mar. 28 —1582, Sep. 29; b. Avila, in Old Castile; daughter of Alfonso, of the noble House of Sanchez de Ceyeda. When she was but seven years old, she and her little brother, Rodrigo, fled from her father's house, with the design of offering themselves for the crown of martyrdom among the Moors, but were overtaken, and restored to their parents. Her mother died while Teresa was young, and for a time she engaged in the common vanities of her age, till she was sent for education to a convent at Avila, from which, however, she was compelled by illness to return home in her 16th year. During her illness, she resolved, notwithstanding the very earnest opposition of her father, to become a nun; and having in her 18th year entered a convent of the Carmelite order in her native city, she made her solemn vow 1534, Nov. 3. In this convent she remained nearly 30 years, but it was not till about the year 1539 that her constitution became strong enough to permit her to follow, even in an imperfect way, the observances of conventual life. Her own account of her mental and spiritual condition during this period, which extended to 1554, is extremely interesting; and, like the confessions of St. Augustine and other saints, has furnished endless materials to the spiritualists of later times. The change of heart and of purpose, known as her conversion, was in 1554, and was as complete and decisive as her former condition had been purposeless or fluctuating. It was occasioned by her father's death, which aroused her to serious thought, in which mood one day entering the oratory, she fell entranced before the image of the bleeding Christ. After a time, her religious exercises reached an extraordinary degree of asceticism. Her prayers were almost continual, and she was reported to be favored with visions, ecstasies, and other supernatural visitations, of which many curious details are related by her biographers and in her own letters and papers. The fame of her sanctity spread throughout Spain, and into other lands. By some the reality of the reported supernatural favors ascribed to her was questioned; and there were even some who threatened to invoke the rigorous investigation of the Inquisition; but the popular cre-

dence was freely accorded to her, and the authority of St. Francis Borgia, St. Peter of Alcantara, and other high names, eventually disarmed the opposition. The most notable and permanent fruit of the enthusiastic spirituality of T. is the reform of the Carmelite order, of which she became the instrument. She began this work in concert with a few zealous members of her own sisterhood in the convent at Avila, where she had resided from the date of her profession; but 1562 she obtained permission from the Holy See, under direction of Peter of Alcantara, to remove with her little community to St. Joseph's, a small and very humble convent in the same city, where she established in its full rigor the ancient Carmelite rule, as approved by Innocent IV. 1247, with additional observances introduced by T. herself. About the beginning of 1563, T. took up her abode therein; and 1565 she obtained from Pope Pius IV. a formal approval for the rule as modified by her. For two years, T. lived in great privacy in her little convent of St. Joseph; but 1567 the general of the Carmelite order, F. Rubeo, visited her convent and gave her permission to found other houses under the reformed discipline, for women and for men. T. entered on the work of reform with such energy, that strong opposition was aroused, and the general of the order 1575 procured from the pope a bull prohibiting further establishment of the reformed houses. But after a fierce struggle, she overcame; and in 1579 the Carmelites of the stricter observance established by T. were released from the jurisdiction of the old superiors, and united into a distinct association, with a separate head and a distinct organization, which was approved 1580 by Pope Gregory XIII. Under this new constitution, the association flourished and extended; and within the lifetime of T., no fewer than 17 convents of women and 16 of men accepted her reforms. T. died at Alba, and was canonized by Gregory XV. 1621, her feast being assigned to Oct. 15. She left a number of works, which have at all times had high reputation among the spiritualists of her own church, and whose merits, in many respects, are acknowledged by Prot. writers. They consist of ascetical and mystical treatises, instructions in the conventual life, meditations, etc., besides numerous letters of remarkable literary merit, independent of their doctrinal character. All her writings are characterized by a singularly exalted mysticism (see MYSTICISM). Her works in the original Spanish fill two folio vols., and they have been in whole or in part translated into almost every European language. Her life occupies nearly an entire volume of the new continuation of the *Acta Sanctorum;* and several more popular biographies have been written in Spanish, French, Italian, German—the best known in English being by Canon Dalton (1851), Miss Trench (1875), and Father Coleridge, S.J.

TERETE, a. *tĕ-rēt′* [L. *teres* or *terĕtem*, rounded off—from *tero*, I rub]: in *bot.*, nearly cylindrical; having the transverse section nearly circular.

TERGEMINAL, a. *tĕr-jĕm'ĭ-năl*, or TERGEMINATE, *-nāt*, and TERGEMINOUS, a. *-nŭs* [L. *tergĕmĭnus*, threefold, triple—from *ter*, three times; *gemĭnus*, double]: thrice double; threefold; three-paired.

TERGIFEROUS, a. *tĕr-jĭf'ĕr-ŭs* [L. *tergum*, the back; *fero*, I bear]: in *bot.*, bearing on the back—applied to plants which bear their spores on the back of the leaves, as ferns.

TERGIVERSATION, n. *tĕr'jĭ-vĕr-sā'shŭn* [F. *tergiversation*—from L. *tergiversātĭōnem*, a refusing, a shift—from *tergum*, the back; *versus*, turned, pp. of *vertĕrĕ*, to turn]: a shift: a subterfuge; an evasion; fickleness of conduct.

TERGUM, n. *tĕr'gŭm* [L. *tergum*, the back]: in *entom.* the upper surface of the abdomen.

TERHUNE, *tĕr-hūn'*, MARY VIRGINIA (HAWES) (pen-name MARION HARLAND): author: b. Amelia co., Va., about 1830. She began writing for the papers when 14 years old; was married to Edward Payson T., D.D., 1856; and has been editor of *Babyhood* and *The Home-maker*, magazines. Her publications include: *Marrying Through Prudential Motives*, her first story; *Alone* (1853); *The Hidden Path* (1855); *Miriam* (1860); *Nemesis* (1860); *Husks* (1863); *Husbands and Homes* (1865); *Sunnybank* (1866); *Ruby's Husband* (1868); *At Last* (1870); *Eve's Daughters* (1881); *Judith* (1883); *A Gallant Fight* (1888); *With the Best Intentions* (1890); and *His Great Self* (1892). Other works are: *Common Sense in the Household* (1871); *Breakfast Luncheon, and Tea* (1875); *The Dinner Year-book* (1878); and *Our Daughters, and What Shall We Do with Them?* (1880).

TERLIZZI, *tĕr-lĭt'sē:* flourishing, well-built town of Italy, province of Bari; 20 m. s.e. of Barletta, 8 m. from the Adriatic. It contains a cathedral, a parish church, and three convents. The almond-tree is extensively cultivated in the vicinity. Pop. (1881) 20,442.

TERM, n. *tĕrm* [F. *terme*—from L. *termĭnus*, a boundary: It. *termine*]: a boundary; a limit; the time for which a thing lasts; any limited time; a space or period to which a limit has been set, or in which something runs its course (see TERMS, below): in *logic* the subject or predicate of a proposition; one of the three component parts of a proposition, each of which is used twice: a word or expression denoting something peculiar to an art or a science: in *alg.* or *arith.*, a member of a compound quantity: a word or expression in general: V. to name; to call; to denominate. TERM'ING, imp. TERMED, pp. *tĕrmd.* TERM'ER, n. *-ĕr*, one who travels to attend a court-term. TERM'LESS, a. *-lĕs* boundless. TERM'LY, a. *-lĭ*, occurring every term: Ad term by term. TERMS, n. plu conditions, as in a contract or agreement; words or language, as in good *terms;* footing or relation, as on good *terms;* fees: in *law*, periods of the year during which the particular business in the superior law courts was transacted (see LAW-TERMS); also days on which rents are settled (see QUARTER-DAY). In colleges and universities in the United States, there are usually three terms beginning in Sep., Jan., and Apr., and called the

fall, winter, and spring terms respectively. To BRING TO TERMS, to cause to submit or agree. To EAT ONE'S TERMS, to eat the prescribed number of dinners in the hall of the society, required by the Inns of Court in London, England, as evidence that the prescribed course of study has been completed by those who desire to be called to the bar. To MAKE TERMS, to come to an agreement.—SYN. of 'term, n.': limit; boundary; bound; stipulation; condition; expression; word.

TERMAGANT, n. *tĕr'mă-gănt* [from *Termagant* or *Tervagant*, one of the supposed deities of the Mohammedans, represented in old plays as a personage of a most violent character: comp. It. *Termegisto*, the child of thunder, a great quarrelling boaster]: a boisterous bold woman; a virago: ADJ. turbulent; boisterous or furious; quarrelsome; scolding. TER'MAGANTLY, ad. *-lĭ*. TER'MAGANCY, n. *-găn-sĭ*, the state or quality of being termagant. *Note.*—The Persian is said to be *tir-magian*, 'magian lord or deity.' The word was probably introduced by the Crusaders from the East, and confused, and made a personage co-equal with Mahound or Mahomet, and a god. The personage appeared on the stage in eastern flowing robes, and so in the popular speech the word was transferred to a woman.

TERMES, n. *tĕr'mēz*, or TER'MITE, n. *-mīt*, TERMITES, n. plu. *tĕr'mīts* [L. *termēs*, a wood-worm]: genus of ants found mostly within the tropics, and very destructive to trees and the wood-work of houses; the white ants (see TERMITES).

TERMINABLE, a. *tĕrm'ĭ-nă-bl* [L. *terminus*, a boundary (see TERMINATE)]: that may be bounded or terminated; coming to an end after a certain time. TERM'INABLY, ad. *-blĭ*. TERM'INABLENESS, n. *-bl-nĕs*, the state of being terminable. TERM'INAL, a. *-năl*, forming the extremity; situated at the end; in *bot.*, growing at the end of a branch or stem: N. that which ends; the end; the extremity. TERM'INALLY, ad. *-lĭ*. TERM'INIST, n. *-nĭst*, in *eccles. hist.*, one who maintains that God has assigned to every individual a certain term of repentance.

TERMINALIA, n. plu. *tĕrm'ĭ-nā'lĭ-ă* [L. *terminus*, a boundary, an end]: in *anc. Rome*, the annual festival of *Terminus* (q.v.), the god of boundaries: an interesting genus of plants, ord. *Combretăceæ*, so named from the crowding of the leaves in bunches at the ends of the branches; the species have generally astringent properties, some are used for dyeing and many for tanning: see MYROBALAN.

TERMINATE, v. *tĕrm'ĭ-nāt* [L. *terminātus*, pp. of *terminārĕ*, to bound, limit—from *terminus*, a boundary: It. *terminare:* F. *terminer*]: to bound; to limit; to put an end to; to finish; to come to an end; to be limited; to stop short; to conclude: ADJ. coming to an end; limited. TERM'INATING, imp. TERM'INATED, pp. TERM'INA'TION, n. *-nā'shŭn*, the act of limiting, setting bounds, or of bringing to an end; end in time or existence; conclusion; result; in *gram.*, the ending of a word; in *OE.*, a word; a term. TERM'INA'TIONAL, a. *-ăl*, pertaining to a termination; form

ing the termination or end; arranged according to the terminations. TERM'INA'TIONALLY, ad. *-lĭ.* TERM'INATIVE, a. *-nā-tĭv,* directing termination; absolute. TERM'INATIVELY, ad. *-lĭ.* TERM'INATOR, n. *-tĕr,* the dividing line between the enlightened and the unenlightened part of the moon. TERM'INATORY, a. *-tĕr-ĭ,* bounding; limiting.

TERMINI, *tĕr'mē-nē* (anc. *Thermæ Himærenses*): seaport town on the n. coast of Sicily, 21 m. e.s.e. of Palermo, at the mouth of the river Termini. It is built partly on a plateau (whose highest level is crowned by a castle —now a prison—of mediæval construction), and partly on the slope and in the hollow below. T., with its noble background of towering hills, and its magnificent view of the Mediterranean, well deserves the title *La Splendidissima,* bestowed on it by Emperor Frederick II. Many of the inhabitants are engaged in fishing for tunny and anchovies.—Pop. about 23,000.

The ancient *Thermæ* (of which T. is an Italian corruption) was founded B.C. 408, after the destruction of the Greek city of Himæra, whence its name Himærenses. Whether it owed its origin to the Carthaginians, or to the surviving citizens of Himæra, is doubtful; but it soon passed under the authority of the former, who here defeated the Romans with heavy loss B.C. 260 during the first Punic war. After Sicily became a Roman province, Thermæ was treated with peculiar consideration by its new masters, and became a flourishing place. Relics of the ancient city, e.g., the baths (which are still used), fragments of a theatre, and aqueduct, are visible; and numerous inscriptions, etc., are preserved in public and private collections.—See B. Romano's *Antichità Termitane* (Palermo 1838).

TERMINISM, n. *tĕr'mĭn-ĭzm* [Ger. and mod. L. *terminismus*—from L. *terminus*]: in *chh. hist.*, doctrine (advocated by some in the 17th c.) that there is a terminus in each man's life after which he is no longer capable of receiving grace or pardon of sins.

TERMINOLOGY, n. *tĕrm'ĭ-nŏl'ŏ-jĭ* [L. *terminus,* an end; Gr. *logos,* a discourse]: that branch of a science or art which defines and explains the peculiar words and phrases used in it; the words and phrases used in a science or art; also TERMONOLOGY, n. *tĕrm'ō-nŏl'ŏ-jĭ* [Gr. *termōn* or *termōna,* an end; *logos,* a discourse]. TERM'INOLOG'ICAL, a. *-ĭ-kăl,* pertaining to terminology. TERMINOLOGICALLY, ad. *tĕrm'-ĭ-nō-lŏj'ĭ-kăl-lĭ.*

TERMINUS, n. *tĕrm'ĭ-nŭs,* TERM'INI, n. plu. *-nī* [L. *terminus,* a boundary, a limit]: boundary-stone: the first or last station of a railway. TERMINUS, the Roman god of public and private boundaries—originally apparently identical with Jupiter himself, but gradually recognized as a distinct deity. Such a god was a characteristic conception of the legal and land-loving Roman mind.

TERMITES.

TERMITES: genus of insects of order *Neuroptera*, and family *Termitidæ*; characterized by large, round head, two ocelli, the small prothorax cordate, and feet-cushions lacking. The termites live in great communities, chiefly in tropical countries, and are almost omnivorous, in the larva, and pupa, as well as in the perfect state. In their communities there are five classes—males, females, workers, neuters, and soldiers. The workers, neuters, and soldiers all seem imperfectly developed females. The males and perfect females have four wings, which are long and nearly equal, and which are often suddenly cast off before the termination of their life; but the greater part of the community consists of workers, which are wingless. The 'soldiers' are larger than the neuters, and have very large mandibles, which they are always ready to use upon any assault. Most of the white ants make their nests on the ground, but some of them among branches of trees, decayed or dry wood forming a principal article of their food. The species which make their nests on the ground make them conical, or turret-shaped, often 12 ft., and sometimes even 30 ft. high, in groups, like a little village. The soil where the white ants have labored is particularly good, and the s. Africans take advantage of its excellent quality. The nest is divided internally into numerous chambers and galleries; there are generally two or three roofs within the dome-shaped interior, and the thick walls are perforated by passages leading to the nurseries and magazines of food. If a breach is made in the building, the soldiers appear, ready for defense. White ants are very useful in consuming every kind of decaying animal or vegetable matter. They even eat grass, and the snapping of multitudinous mandibles has been likened to the sound of a gentle wind among trees. They sometimes attack the wood-work of houses, and soon reduce the thickest timbers to a mere shell. Extraordinary and incredible stories are told of their attacking and devouring large animals, but it seems probable that they do so only when the animals are helpless from age or sickness. They come in vast hosts to any place where food is to be found, and are not easily driven off; multitudes pressing on, though previous multitudes have been destroyed. They gather great stores of corn into their nests, of which the natives of Africa often avail themselves. They are themselves also eaten in Africa, and are said to be delicate and pleasant food. The abdomen of the pregnant female T. becomes dilated to an extraordinary degree, so as to exceed the rest of her body 1,500 or 2,000 times, and she is then about 1,000 times heavier than the male insect. Her fecundity is prodigious; she is supposed to lay more than 31,000,000 of eggs in a year.

The T. which live in trees construct nests of great size, like sugar-casks, of particles of gnawed wood, cemented by a kind of gluten, and so strongly attached to the branches as not to be shaken down even by violent storms. These species sometimes take up their abode in the roofs

of houses, where they are very destructive to the wood work.

T. mordax and *T. atrox* are among the African ground-building species. *T. lucifugus* is found in s. Europe, and has proved very destructive in the navy-yard of Rochefort, and elsewhere in s. France. Sulphurous gases and chlorine are forced into its galleries, without completely effecting its extirpation. *T. flavicollis* is very injurious to olive trees in Spain. *T. flavipes* is a N. Amer. species which often inflicts much damage, especially in the s. U. S. *Psocus pulsatorius*, a Brit. species, one of the Termitidæ, is one of the class of insects in houses, which emit a sound like the ticking of a watch. The species of the genus *Psocus* are very small, active insects, living beneath the bark of trees, in wood, straw, etc.—In books of travels the T. are often called ants, their habits being similar, though they belong to a different order of insects.

TERN, a. *tĕrn* [L. *terni*, three each—from *ter*, thrice]: chiefly in *bot.*, threefold; consisting of three: N. what is composed of three things or numbers. TERNARY, a. *tĕr'-nĕr-i*, proceeding by threes; consisting of threes; arranged in threes: N. the number three; also TER'NION, n. *-nī-ŏn*. TER'NATE, a. *-nāt*, in *bot.*, composed of three leaflets, as compound leaves. TERNARY COMPOUND, a substance consisting of the three elements, carbon, hydrogen, and oxygen, characteristic of plants.

TERN, n. *tĕrn* [Dan. *terne;* Sw. *tärna;* Icel. *therna*, the sea-swallow]: long-winged aquatic fowl, resembling gulls; a member of the genus *Sterna* and family *Laridæ;* but smaller and more slender than the gull; feet small; wings long and pointed; tail usually long and forked. The plumage is very full. From their forked tail, manner of flight, and small size, the terns are often called sea-swallows. They are incessantly on the wing, skimming the surface of the water, and catching small fishes and other small animals from it. The species are numerous, 50–75, and are found in almost all parts of the world: some are of very wide geographic distribution. Many are birds of passage. Thus, all which occur in n. parts of the world are mere summer visitants. The COMMON T. (*Sterna hirundo*) is abundant on s. shores of Britain, rarer in the n.; it closely resembles our common Forster's T.; but the name Common T. is applied to a number of species. WILSON'S T. (*S. Wilsoni*), of our Atlantic coast, is popularly called the Mackerel Gull from its supposed appearance about the time that mackerel are first taken.

TERNANT, *tĕr-nong'*, JEAN DE, Chevalier: about 1750–1816; b. Sez, Normandy. He came to this country with Baron Steuben, and served in the army during the revolution. In 1778, Apr., he was commissioned maj., and appointed sub-inspector in Steuben's division; 1778, Sep., he was made lieut.col. and inspector of the army in Ga. and S. C. In 1780 he was taken prisoner at Charleston, but soon exchanged, and 1781 was engaged at the siege of Yorktown. At the close of the revolution he returned to

France, re-entered the French army, and rose to the rank of col. 1790–1803 he was ambassador to the United States. He died at Couches, Normandy.

TERNATE, *tĕr-nāt'* or *tĕr-nā'tā:* island in the E. Indian archipelago: see MOLUCCAS.

TERNAY, *tĕr-nā'*, CHARLES LOUIS D'ARSAC DE: French naval officer: 1722–1780; b. Laudun, France. He entered the French naval school 1738. In 1757 he served at the siege of Louisburg, and subsequently commanded a division of gun-boats on the St. Lawrence. In 1762 he was in command of a squadron sent against Newfoundland. He landed at St. John June 2, and soon afterward captured it, with several British merchant vessels; 1772–79 was gov. of the island of Bourbon; 1780 commanded the fleet which brought Count Rochambeau and his army to the aid of the colonies. T. died at Newport.

TERNI, *tĕr'nē* (anc. *Interamna*): town of central Italy, prov. of Perugia; on the right bank of the Nera (anc. *Nar*), a little below its confluence with the Velino; 49 m. n.n.e. of Rome. It is encircled by a wall, with towers and five gates; is well built; gives name to an archbishopric; and possesses a cathedral, several fine palaces and churches, a hospital, theatre, and various monuments of antiquity, as the ruins of an amphitheatre, temples, and baths. T. manufactures silk and woolen fabrics. About two m. from the town is the famous cataract of Velino, about 650 ft. high (in three falls—65 ft., 330 ft., and 190 ft.), celebrated by Byron in *Childe Harold.*—Pop. 11,000.

Ancient *Interamna*, according to classic tradition, was founded only 80 years after Rome, but we have no knowledge of its history until it ceased to be an Umbrian, and became a Roman city. About the time of Marius and Sulla, it was (according to Florus) one of the *florentissima Italiæ municipia*, but at no period very prominent.

TERNSTRŒMIACEÆ, *tĕrn-strē-mĭ-ā'sē-ē:* natural order of exogenous plants, allied to *Guttiferæ*, and consisting of trees and shrubs, natives of warm and temperate countries. About 150 species are known. They are most abundant in S. America; a few are found in N. America; some in India, China, and other parts of the East; only one African species is known; and Europe produces none. The leaves are alternate, leathery, in many species evergreen, generally undivided, sometimes dotted. The flowers are on axillary or terminal stalks, generally white, sometimes pink or red; with 5–7 concave, leathery, deciduous sepals, and 5–9 petals which are often combined at the base; many hypogynous stamens, either free or variously combined; 2–7 filiform styles, more or less combined; the fruit a 2–7-celled capsule, either opening by valves, or leathery and indehiscent, the seeds large, few, and attached to the axis, the cotyledons very large, often containing much oil. This order is very important as containing the Tea-shrubs. It is also interesting for the great beauty of the foliage and flowers of many species, of which the genus *Camellia* affords the best-known examples. See TEA: CAMELLIA: GORDONIA.

TERPENES, n. *tĕr-pē'nēz* [see TEREBINTH]. the class of volatile oily bodies of which turpentine is most important.

TERPSICHORE, n. *tĕrp-sĭk'ŏ-rē* [Gr. *Terpsichŏrē*—from *terpein*, to enjoy; *choros*, dancing]: in *anc. Gr. myth.*, that one of the nine muses who presided over choral song and the dance. TERPSICHOREAN, a. *tĕrp'sĭk-ō-rē'ăn*, pertaining to the muse who presided over dancing.

TERRA, n. *tĕr'rā* [L. and It. *terra*, earth, clay: Gael. *tir*, land, earth]: the earth; earth; clay. TER'RA COT'TA, *kŏt'tā* [It., baked clay]: kind of fine clay formed into works of art, which are afterward burned in the same manner as bricks—anciently used for portable statues: the Greek terra-cotta figures are the materials of a very interesting branch of archeology recently largely developed.—The term is now applied chiefly to manufactures of brick earth for ornamental—especially architectural—purposes. About the beginning of the 18th c., it was common in Brit. architecture; but after the reign of Queen Anne, its use was discontinued. A complete revival has now taken place, and this material has been applied with admirable effect in numerous buildings of great size and fine design. TER'RA FIR'MA, *fĕr'mă* [L. *firma*, solid, stable]: solid earth, as opposed to water; dry land; sometimes denoting continental land as distinguished from islands (see below). TER'RA INCOG'NITA, *ĭn-kŏg'nĭ-tă* [L. *incognita*, unknown]: unknown or unexplored land. TER'RA JAPON'ICA, *jĭ-pŏn'ĭ-kă* [L., Japanese earth]: same as *catechu*, a substance obtained from the juice of a species of acacia, formerly supposed to be a kind of earth from Japan: see CATECHU. TER'RA LEM'NIA, *lĕm'nĭ-ă* [L., Lemnian earth]: a medicinal earth, soap-like and detergent. TER'RA PONDERO'SA, *pŏn'dĕr-ō'są* [L., heavy earth]: barytes or heavy spar. TER'RA DI SIEN'NA, *sī-ĕn'nă* [It., earth from Sienna]: a ferruginous ochreous earth used as a pigment in both oil and water-color painting, when burnt becoming of a deep-orange tint (see BURNT SIENNA). TER'RA VER'DE, *vĕr'dē* [It., green earth]: native green earth, found at Verona and in Cyprus, used as a pigment in painting.

TERRA, *tĕr'rā*, or TELLUS, *tĕl'ŭs:* in *Rom. myth.*, one of the oldest of the deities, the goddess of earth, corresponding to Gē of the Greek mythology. She was the wife of Uranus, and mother of Oceanus, the Titans, Giants, and Cyclops. Her festival was celebrated April 15, though offerings were made to her at every seed-time and harvest. Her worship was almost universal; temples, altars, and statues being erected in her honor in nearly every country. She is identical with Cybele.

TERRACE, n. *tĕr'rās* [F. *terrasse*, a terrace—from It. *terrazza*, an open walk—from L. *terra*, earth: Sp. *terrasa*, a terrace]: a raised bank or platform of earth, either natural or artificial; any shelf or bank of land having a uniformly flat or level surface; any flat work or place raised above the ground; an open gallery; the flat roof of a house; a name given to a row of houses: V. to form into a terrace. TER'RACING, imp. TER'RACED, pp. *-rāst:* ADJ. formed into a terrace; having a terrace.

TERRACINA, *tĕr-râ-chē'nâ* (anc. *Tarracina*): town of central Italy, in the prov. of Rome, on the coast at the s.e. extremity of the Pontine Marshes, near the mouths of the Ufente and Amaseno; about 60 m. s.e. of Rome. It is the seat of a bishop; possesses a cathedral (built probably on the ruins of a heathen temple), a square with a handsome fountain, a palace of Pius VI., and, on the summit of a precipice overlooking the town, the ruins of a palace of Theodoric, King of the Goths. The harbor, a naval station of the Romans, is now filled up.—Pop. (1901) 9,000.

Tarracina was originally a Volscian town, and was called by the Volscians *Anxur,* a name often applied to it by the Latin poets. It fell into the hands of the Romans B.C. 400, became the seat of a Roman colony B.C. 329, and as long as the republic and empire lasted was flourishing and important. So closely do the mountains here approach the sea, that there was scarcely room for the celebrated 'Appian Way;' hence the importance of Terracina as a military position. Numerous ruins of the ancient town are visible.

TERRA COTTA: hard baked clay or earthenware of exceptionally good quality, of uniform texture, hard and durable. The *English Dictionary of Architecture,* completed before there was much use in England of materials made with cement, speaks of it as artificial stone; but the term has also been used largely for that ancient earthenware of which are made the painted Greek vases which are so important in the history of art, and the inferior but still interesting pieces of Etruria. In common usage, however, the term is employed for such baked clay as is used in connection with architecture, whether in actual building, as where a hollow mass of the baked clay takes the place of a stone, or where a solid casting in the same material is used for molded string-courses and the like, in this way replacing bricks. Bricks, indeed, when made of choice material exposed to a great heat, are in all practical respects the same as unglazed terra cotta.

In the European Middle Ages terra cotta, unglazed, and also covered by a colored enamel, was used for roof tiles, and also for the much more elaborate pieces employed for crestings, and especially for those finials (in French *épis*) which are used where the hips of the roof meet the ridge, and where in this way a salient point is produced. These finials often include the wind-vane, which, however, would be commonly of wrought iron. The custom of using terra cotta in these ways lasted into the time of the revival of classic architecture, and some of the most interesting pieces are French of the 16th century; the custom not disappearing until the complete establishment of pseudo-classic uniformity of design throughout Europe. Chimney tops pierced with decorative openings through which the smoke might issue were also made of terra cotta, and the custom still lingers in those simply

built houses of Italy, Greece, and Switzerland, where chimneys are built of hard baked earthenware tiles set in strong cement mortar, and in this way made very light and thin.

Purely decorative pieces were also made of this material; but in the way of architectural adornment the most important development was in that Della Robbia ware (q.v.) which, however, is not often spoken of as terra cotta because it is covered completely by an opaque enamel which receives a most brilliant and effective polychromy, adding in this way color to sculpture in the most emphatic and interesting way known since antiquity. Still such pieces as the door-heads of many churches in Florence and elsewhere, and the magnificent altar-backs; the lavabos or washing fountains, and the like, throughout central Italy, are among the most effective pieces to be found in that region. The most extensive and splendid work in Della Robbia ware is the broad frieze of the Hospital at Pistoja.

Modern architectural terra cotta continually comes to the front as a material allowing of much richer treatment at a reasonable price than carved stone; but for some reason it never becomes very general in its application. A large business building in New York had its roof brackets or consols made of this material before 1855. The Boston Museum of Fine Arts contains much decorative terra cotta brought from England, and this front was completed about 1865. The constant demand for fireproof materials by means of which the exterior of a large building might remain without serious damage in spite of a hot fire across the street, would seem to make brick and terra cotta the obvious material for the facing; but stone, marble and granite still retain their places as the only materials in favor. One minor reason for this may be in the necessity of filling the hollow block of terra cotta with cement in order that it may be a mass solid enough to take the superincumbent weight. The general tendency of the time toward the evidence of great cost and the supposed inferiority in dignity of materials of baked clay are probably the decisive reasons for this neglect.

TERRA DEL FUEGO, *tĕr'râ dĕl fwā'gō,* correctly, Tierra del Fuego (q.v.).

TER'RA DI LAVORO, *dē lâ-vō'rō* (*Campania Felix*), now CASERTA: maritime province of s. Italy, bounded n.w. by the former Papal States; 2,326 sq.m. This is the famous *Campania Felix* of the ancients. Pliny extols its beauty and its fine situation. Florus calls it the finest country in the world. In ancient times, it was inhabited by the Ausonii, the Osci, and later by the Campani. The finest part of Campania has been separated from it, and is that fertile tract which surrounds the Gulf of Naples like an amphitheatre; another part has been added to the province of Molise. Terra di Lavoro is watered by

two rivers, the Liris of Garigliano and the Volturno. Toward the e. it is broken up by the Apennines; and its beautiful ranges of hills are clothed with vine and olive yards, and studded with country-seats. It produces corn, strong wines, oil, fruits, and silk. Its seaport-towns are populous and busy, though here and there the sea-board presents marshes. The climate is very mild in winter, and extremely hot in summer. Pop. (1901) 785,357.

TER'RA FIRMA, *-fėr'mâ:* term specifically applied in geog. to two different regions: 1st. All the mainland of Italy which acknowledged the supremacy of Venice—viz., the duchy of Venice, Venetian Lombardy, the March of Treviso, the duchy of Friuli and Istria. 2d. Extensive tract of S. America, bounded by the Pacific Ocean, Peru, the silvas of the Amazon, the Atlantic Ocean, and the Isthmus of Panama—mostly belonging to the Spaniards during the 18th c.; in a still more restricted sense, the term was applied by the Spaniards to the Isthmus of Panama itself.

TERRANOVA, *tĕr-râ-nō'vâ,* or TERRANUOVA, *-nô-ō'vâ:* seaport-town on the s. coast of Sicily, province of Caltanisetta; on the right bank of the Omonimo, 18 m. e. from Alicata. There is no regular port, but the town has good trade in fruit, corn, pulse, sulphur, soda, and above all, in cotton, large quantities of which are grown in the vicinity. A kind of course cloth is manufactured for home consumption. Terranova is believed to occupy the site of anc. Gela (q.v.). The town now standing was built by Frederick II. 12th c. In its neighborhood is the village of Mazarino, from which the famous cardinal took his name.—Pop. 18,000.

TERRAPIN, n. *tĕr'ră-pĭn,* or TER'RAPENE, n. *-pēn:* large kind of turtle, living in tidal water, highly valued as delicious food. The name is popularly given to many species of turtles (see TURTLE: TORTOISE), of the family *Emydæ* (see EMYS), natives of tropical and warmer temperate countries. The neck can be wholly retracted within the shell; the head is flat, and the jaws prolonged into a beak. They feed partly on vegetable food, also on fish, reptiles, and other aquatic animals. They swim very well, and even on land move with much more swiftness than land-tortoises. Several species are natives of N. America.

TERRA VERDE, or VERTE: (Italian, 'green earth'), a green mineral pigment used by painters in oil. A deposit of this earth is found in the neighborhood of Verona, Italy. There is a similar deposit in the island of Cyprus. The native green found in Italy is a silicious earth colored by protoxid of iron of which it contains about 20 per cent, and it is of extreme value as a permanent and brilliant tint in landscape painting.

TERRE, n. *tĕr* [F. *terre,* earth—from L. *terra,* earth].

TERRE-BLUE, *tĕr'-blô,* a kind of earth of a blue color. TERRE-PLAIN, *-plān,* less correctly TERRE-PLEIN [F. *plain,* flat—from L. *plānus,* even, level]: in *fort.,* the level terrace of the rampart, 25 to 40 ft. wide, on whose front portion the parapet and banquette are formed (the cannon being mounted on the parapet), while its rear slopes downward to the general level of the inclosure; also, the natural ground on which a gun stands.

TERRE HAUTE, *tĕr'rĕh hōt:* city, capital of Vigo co., Ind.; on the Wabash river and the Wabash and Erie canal, and on the Chicago and Eastern Illinois, the Cleveland, Cincinnati, Chicago and St. Louis, the Evansville and Terre Haute, the Terre Haute and Peoria, and the Vandalia Line railroads; 73 m. w. of Indianapolis; equidistant from Chicago, Cincinnati and St. Louis; 5 sq.m. It is laid out in rectangular form on a bluff on the e. bank of the river, 60 ft. above high water; is underlaid with semi-block and bituminous coal; and is 12 m. from the great block coal mines of Clay co. The vicinity has also large agricultural worth. It is one of the prominent railroad and manufacturing centres of the middle west. It stands in a rich agricultural region, and is in the centre of coal-fields extending over an area of 2,000 sq.m. Coal is shipped to all points within a radius of 200 m. Terre Haute is the commercial centre for a large part of the w. portion of Indiana, and the e. portion of Illinois. The streets are broad and inviting; there are natural and manufactured gas and electric light plants; the water-works system has been improved recently at a cost of $300,000; and the drainage is thorough. Coal is shipped from here to points within a radius of 200 m., and it is a distributing point for about 1,500 carloads per day. The manufacturing industries embrace rolling mills, foundries, distilleries, breweries, flour mills, hominy mills, car works, railroad shops, glass factories, stamping works, feed mills, tool works, fencing works, and carriage factory. In the vicinity are large deposits of shale and clay and a number of clay plants are in operation nearby. In 1900 (government census) the total number of manufacturing establishments was 429; total capital invested in plants, $8,938,107; average employees yearly, 5,427; annual wages paid to employees, $2,298,585; cost of material during year, $8,029,285; total annual value of products, $27,784,619. Owing to the failure of the natural gas supply in many places, there has been since 1900 an influx of manufacturing industries to take advantage of the cheap fuel and the railroad facilities. This accounts for the large increase in population.

The prominent public buildings are the government building, the county court-house, city hall, opera house, the Union Station, the schools, churches, charitable institutions, hotels, and several business houses. The Rose Ladies' Aid Society cares for a large number of the poor,

and has charge of the Home for Old Ladies. This home has an endowment of $100,000. The other institutions and organizations for the relief of the needy are Saint Anthony's Hospital (building cost $160,000), in charge of the Sisters of Saint Francis; Saint Ann's Orphan Asylum, in charge of Sisters of Providence; Rose Orphan Home, endowment, $200,000, building, $130,000; Union Hospital (Protestant), endowment, $25,000; Rose Dispensary, endowment, $200,000; and a number of church aid societies. The educational institutions are the Indiana State Normal School, which in 1903 had enrolled 1,036 pupils; the Rose Polytechnic Institute, founded by Chauncey Rose and opened in 1883; a high school, public elementary schools, Roman Catholic and Lutheran parish schools; Saint Joseph's Academy (R.C.); a public library, and libraries connected with the Normal School, the Polytechnic Institute, and the high school.

The three national banks have a combined capital and surplus of about $1,100,000; one savings bank has deposits amounting to $1,000,000; and a loan and trust company has a capital and surplus of $300,000. There is one private bank. The average annual cost for municipal maintenance and operation is $400,000. The public schools cost annually about $140,000; the police department $29,000; the fire department $40,500; for municipal lighting and streets $50,000.

The city is governed by a special charter granted by the legislature. The mayor and common council appoint or elect the administrative officials. The mayor appoints the boards of public works and public safety; the school board is elected by the council. Terre Haute was laid out 1816 in what was known as the Fort Harrison prairie, and chartered as a city 1853. Pop. (1910) 58,157.

TERRELL, *tér'ël:* city in Kaufman co., Tex.; on the Texas and Pacific and the Texas Central railroads; 32 m. e. of Dallas. It is in a fruit-raising and agricultural region, and has important dairy and cattle interests. There are railroad shops, cotton-gins and compresses, cottonseed oil mills, flour mills, creameries, and an agricultural implement factory. Terrell is the seat of the North Texas Hospital for the Insane, and is the seat of Terrell University. It contains several churches and 2 high schools (one for colored). One-tenth of the population are negroes. Pop. (1900) 6,330; (1910) 7,050.

TERRENE, a. *tĕr-rēn'* [L. *terra*, earth]: pertaining to earth; earthy: N. in *OE.*, surface of the earth.

TERRESTRIAL, a. *tĕr-rĕs'trĭ-ăl* [L. *terres'trĭs*, belonging to the earth—from *terra*, the earth]: existing on the earth; pertaining to the world or the present state; mundane; opposed to *celestial:* N. an inhabitant of the earth. TERRES'TRIALLY, ad. *-lĭ.* TERRESTRIAL MAGNETISM, the magnetic force exerted by the earth. See MAGNETISM, TERRESTRIAL.

TERRESTRIAL TEMPERATURE: degree of the earth's sensible heat as measured by the thermometer. The distribution of heat over the globe is represented by isothermal lines, or lines drawn through all places having the same mean temperature: see ISOTHERMAL LINES. The mean annual temperature is shown by the lines in fig. 1, and the warmest and coldest months in fig. 2, the dotted lines showing the mean temperature for January, and the solid lines the temperature for July.

The part of the globe having the highest mean annual temperature forms an irregularly shaped belt along the equator, comprised between the n. and the s. isothermals of 80°. On either side of this warm belt the temperature diminishes toward the poles; and the lines showing successively this diminution are speaking in a very loose sense, arranged parallel to the equator, thus showing the predominating influence of the sun as the source of terrestrial heat. The coldest portion of the earth's surface is a small oval-shaped patch near to but not surrounding the n. pole, its mean temperature being —4°. Its narrowest diameter lies n. and s., nearly touching the pole on one side, and extending on the other as far s. as 72°·30 n. lat. in 130° w. long. Part of it is seen in the diagram. On looking at the isothermal of 0°, one might be led to suppose that there are two centres of greatest cold, one n. of Siberia, the other n. of Brit. America. This, however, is not the case—the apparent double centre of greatest cold being due solely to the isothermals being drawn on Mercator's projection of the earth; for if an isothermal map be drawn on a polar projection, the lines of mean annual temperature inclose one connected space of greatest cold, and not two such spaces, as is frequently supposed.

While the decrease of temperature in advancing toward the poles corresponds in a general way to what may be called the solar climate, there are deviations due to disturbing causes too important to be overlooked. These disturbing causes are (1) the currents of the sea; (2) the prevailing winds; (3) large surfaces of water which are frozen during part of the year.

The influence of an oceanic current depends on the temperature of the place whence it starts, or which it passes, and of the place at which it arrives. Hence the great equatorial current, flowing from e. to w., does not require to be considered here, because the heat remains the same throughout its course; but only those currents are here to be considered which convey the waters of the sea to higher or to lower latitudes. Of these, the most marked and important is the Gulf Stream in the n. Atlantic, which, by conveying warm water to the arctic regions, pushes the isothermals many degrees northward. There is a similar, though much feebler, current passing from the n. Pacific to the Arctic Sea through Behring Strait; there, accordingly, the isothermals are pushed a little northward. In the s. hemisphere there are two currents: one discovered by Humboldt, passing from the Antarctic Ocean northward by the coast of Peru as far as Lima; the

other flowing from the Cape of Good Hope northward along the w. coast of Africa: these currents, flowing from colder to warmer latitudes, lower the temperature, and thus drive the isothermals toward the equator. Again, the great equatorial current, after impinging on the e. coast of Africa, turns s., and, by the warmth that it imparts, pushes the isothermals into higher latitudes. For the same reason,

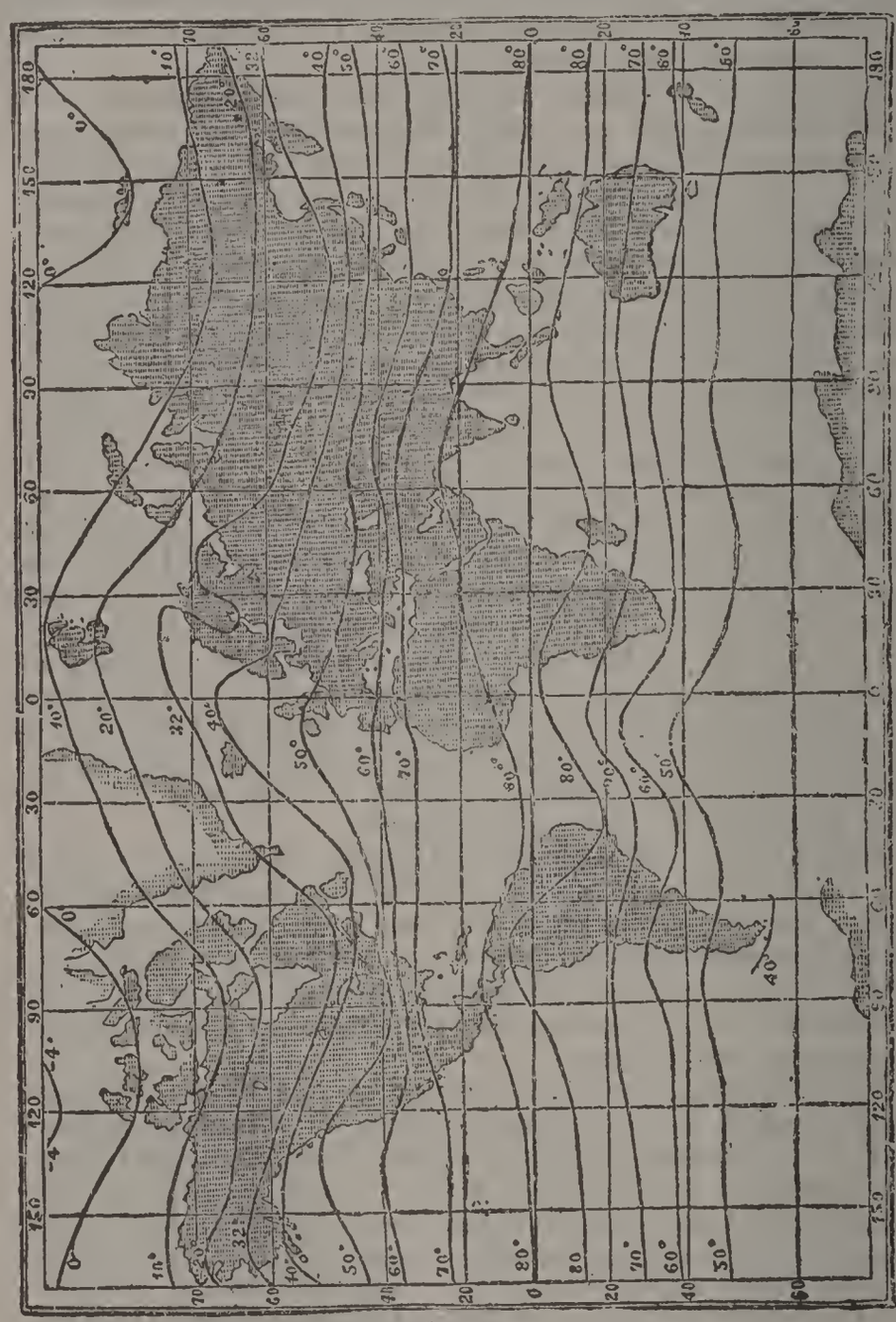


Fig. 1.

the current flowing s. past the coast of Brazil raises the temperature in the e. of that country. The influence of these great currents is more distinctly marked in the forms of the isothermals for Jan. and July. Thus, in Jan., when the relative excess of the temperature of the Gulf Stream is greatest, the isothermals are driven very far to the north similarly, in the s. hemisphere, the currents from the Antarc

tic Ocean being coldest in July, the isothermals during that month are deflected more toward the equator. The most remarkable lowering of the isothermals occurs in Labrador and Newfoundland during May and June, and is caused by the icebergs which then descend on these coasts from Davis's Strait.

Since winds bring the temperature of the regions that they have crossed, the equatorial current is a warm wind,

Fig. 2.

and the polar a cold wind; also winds arriving from the ocean are not subject to such variation of temperature during the year as winds from a continent. As an atmosphere loaded with vapor obstructs both solar and nocturnal radiation, it follows that moist winds are accompanied with a warm temperature in winter, and a cool temperature

in summer, and dry winds with cold winters and hot summers. The direction of mountain ranges also is an important element in estimating the influence of winds on temperature. These considerations explain the position of the isothermals in the n. temperate zone, where the prevailing wind is the s.w. or anti-trade (see WINDS). In Jan., the w. parts of each continent have a comparatively high temperature, from their proximity to the ocean, whose high temperature the winds waft thither; and they are further protected from extreme cold by their moist atmosphere and clouded skies. But in the interior of the continents it is otherwise; for the winds becoming colder as they advance, and being deprived of their moisture as they cross the mountains in the west, the soil is exposed to the full effects of radiation during the long winter nights, and, as a consequence, the temperature rapidly falls. In the centre of Siberia, the Jan. temperature falls to −40°, which is 9° colder than the coldest part of the Amer. continent; and this centre of greatest cold lies near the e. part of the continent of Asia. On the other hand, in July, the interior of continents is much warmer than their w. parts. Hence the interior and e. parts of Asia and and America are characterized by extreme climates, and the w. parts by equable climates. Thus, at Yakutsk, in Siberia, the July temperature is 62°·2, and the Jan. −43·8, the difference being 106°·0; while at Dublin these are respectively 60°·8 and 38°·5, the difference being only 22°·3. This constitutes the most important distinction of climates, as respects both vegetable and animal life. On man especially the effect is very great—the severity of the strain of extreme climates on his system being shown by the rapidly-increasing death-rate as the difference between the July and Jan. temperatures increases.

The great fresh-water lakes of N. America—Superior, Huron, Erie, Michigan, Ontario, Bear Lake, etc.—exercise important influence on the climate of central N. America; for in winter, America, with its frozen lakes, is an unbroken continental mass, and its winter climate is therefore continental; whereas in summer its numerous large sheets of fresh water communicate to large portions of it many of the features of an insular summer climate.

The whole effect of the disturbing causes is seen at once if we compare the observed temperature of a place with its normal temperature—i.e., the temperature due to it in respect of its latitude. In the n. hemisphere, in Jan., the sea and the w. parts of the continents are an excess of their normal temperature; elsewhere there is a deficiency. There are two centres of excess: one n.e. from Iceland, amounting to 41°; the other in Russian America, amounting only to 18°; and two centres where the temperature is deficient: one at Irkutsk, amounting to 41°; and the other w. of Hudson's Bay, amounting to 27°. In July the United States, Europe, Asia, the Indian Ocean, n. Africa, and the extreme n. of S. America have their temperature in excess, while elsewhere it is deficient. The centres of excess are n. of Siberia, 13°·5; Red Sea, 11°·0; and n.w. of

the United States, 4° ·5: and the centres where the temperature is deficient are the entrance to Hudson's Bay, 11° ·0; and the Aleutian Islands, 11° ·0.

As to *underground temperature,* protracted investigation, involving data, widely differing, from very various deep mines and borings in remote parts of the earth, has led to the conclusion that a descent through 64 ft. through the crust of the earth corresponds to a rise of 1° Fahrenheit.

TERRET, n. *tĕr'rĕt,* or TERRIT, n. *tĕr'rĭt* [F. *touret,* a small wheel]: in *saddlery,* a ring attached to the pad or saddle and hames of harness, through which the driving-reins pass.

TERRIBLE, a. *tĕr'rĭ-bl* [F. *terrible*—from L. *terrĭb'ĭlĭs,* frightful—from *terrĕō,* I frighten: It. *terribile*]: that excites or is fitted to inspire terror or dread; fearful; awful; *colloquially,* so great as to incommode or offend; very great. TER'RIBLY, ad. *-blĭ,* very much; exceedingly; very. TER'RIBLENESS, n. *-bl-nĕs,* the quality or state of being terrible; dreadfulness.—SYN. of 'terrible': frightful; dreadful; horrible; tremendous; terrific; horrid; formidable; shocking.

TERRIER, n. *tĕr'rĭ-ĕr* [F. *terrier,* a burrow—from F. *terre;* L. *terra,* the earth]: small rough-haired dog remarkable for vivacity and courage and for the eagerness with which it follows animals into their burrows or holes. It will readily attack animals much larger than itself. Terriers are of great use for killing rats: they are used also for driving the fox from his retreat; and a large variety, the *Saufinder*—i.e., Boar-seeker—is employed in Germany to rouse the fiercest beasts of the forests from their lairs. The varieties of terriers are numerous. Two are widely known—Scotch and English terriers; the former with long, rough, wiry hair, with which even the face is much covered; latter with smooth, short hair. The ears are either erect and pointed, or have pendant tips. The Skye terrier is a breed of Scotch terrier, peculiarly prized. Dogs very similar to the terrier have existed in n. Europe in a domesticated state from remote antiquity. The Bull terrier is probably a cross between the terrier and the bull-dog (q.v.).

TER'RIER [OF. *terrier*—from L. *terrarius,* of land, in *terrarius liber,* book of the land—from *terra,* land], in Feudal Law: description or enumeration of lands and tenements; survey or register of ecclesiastical lands, etc.

TERRIFY, v. *tĕr'rĭ-fī* [F. *terrifier,* to terrify—from L. *terrĕō,* I frighten; *facĭō,* I make]: to excite great fear or dread in; alarm or shock with fear. TER'RIFYING, imp.: ADJ. filling with fear or dread; frightening. TER'RIFIED, pp. *-fīd.* TERRIFIC, a. *tĕr-rĭf'ĭk,* causing or fitted to cause great dread; fearful; dreadful.

TERRIGENOUS, a. *tĕr-rĭj'ĕ-nŭs* [L. *terrigĕna,* born of

the earth—from *terra,* earth; *gigno,* I beget]: produced by the earth; earth-born.

TERRITORIES, *tĕr'rĭ-tō-rĭz,* IN THE UNITED STATES: administrative circumscriptions of regions under the jurisdiction of the United States that have not yet been admitted to the complete rights of state autonomy. A territory in the United States has its chief executive, administrative, and judicial officers named by the president. When 'organized,' a territory has a legislative body of limited powers, whose acts are subject to the approval of congress: its representative in congress is termed Delegate (q.v.). The organized territories (1909) were Alaska, which was organized 1868, July 27; Arizona, 1863, Feb. 24; Hawaii, 1900, Apr. 30; New Mexico, 1850, Sep. 9; Porto Rico, 1898, Aug. 12; and the District of Columbia, 1790, July 16. In addition to the above territories the United States controls the colony of Guam and the Philippines.

TERROR, n. *tĕr'rĕr* [F. *terreur*—from L. *terror,* great fear—from *terrĕō,* I frighten: It. *terrore*]: great fear; alarm that agitates the body and mind; dread; consternation; a cause of extreme fear. TER'RORLESS, a. *-lĕs,* free from terror. TER'RORIZE, v. *-īz,* to fill with terror; control by terror; intimidate; appall. TER'RORISM, n. *-ĭzm,* a state of being terrified or put in bodily fear; government by terror. TER'RORIST, n. *-ĭst,* one who advocates terrorism; one of the extreme French revolutionists. REIGN OF TERROR (see under REIGN). TERROR-SMITTEN, a. overwhelmed with terror. KING OF TERRORS, death.—SYN. of 'terror': consternation; dread; dismay; alarm; fright; fear; trepidation; panic; apprehension.

TERRY, *tĕr'rĭ,* ALFRED HOWE: soldier: 1827, Nov. 10—1890, Dec. 16; b. Hartford, Conn. After a course in the Yale Law School, he began practice 1849, was clerk of the state superior and supreme courts 1854-60, and commanded a militia regiment. At the opening of the Civil war he was appointed colonel of the 2d Connecticut volunteers; participated in the battle of Bull Run; organized the 7th Connecticut volunteers at the expiration of his short enlistment; and served in the South Carolina campaign, having part in the capture of Fort Pulaski, of which he was placed in command. Promoted to brigadier-general of volunteers, he was engaged in the operations against Charleston, led the expedition of Stone river, and, after the capture of Fort Wagner, had charge of the northern district of the Department of the South. In the Virginia operations of 1864 he was commander of a division of the 10th army corps, was brevetted major-general of volunteers, and engaged in the actions at Chester Station, Drewry's Bluffs, Bermuda Hundred, Fussell's Mills, Deep Bottom, the siege of Petersburg, and in the battle of Newmarket Heights. In 1865 he became still more distinguished as commander of land forces in the attack on Fort Fisher,

and especially in the severe assault Jan. 15, resulting in the enemy's loss of 2,000 men captured, 500 killed and wounded, the abandonment of fortifications on Cape Fear river, and the seizure of a great quantity of arms, ammunition, and stores. For this he was promoted brig.-gen. U. S. army and maj.-gen. of vols., and received the thanks of congress. He was afterward active in the capture of Wilmington, N. C., and in the operations of Gen. Sherman. The month preceding the close of the war he was brevetted maj.-gen. of the regular army, and promoted to that rank 1886. Before his retirement from service 1888, he commanded at various times the depts. of Va., Dak., the South, and last that of Mo. It was not known until recently that by high-minded silence, out of regard to the chivalrous Gen. Custer, he assumed responsibility for the disaster of that officer 1876, which resulted from disobedience to orders. Gen. Terry died in New Haven, Conn.

TER'RY, Ellen Alice: actor: b. Coventry, Eng., 1848, Feb. 27. She made her first appearance on the stage when 10 years old as Mamillius in *Winter's Tale*, at the Princess's Theatre, London, and then played at the Haymarket and other London theatres till 1867, when she retired. 1875 she played at the Prince of Whales's Theatre; 1876 created the principal part in Lord Lytton's *House of Darnley* at the Court Theatre; and since 1878 has been Henry Irving's principal support at his Lyceum Theatre, London, and in his tours of the United States (1883, 84, 86, and 88) and of Germany (1889). In Irving's revival of *King Henry VIII.* at the Lyceum Theatre 1892, Jan. 5, she appeared as Katharine of Aragon to his Cardinal Wolsey. In 1906, a magnificient ovation was accorded her in London as a recognition of her great talents.

TERSANCTUS, n. *tèr-săngk'tŭs* [L. *ter*, thrice; *sanctus*, holy]: the part of the thanksgiving introductory to the consecration prayer in the office for Holy Communion in the Church of Eng., which is preceded by Prefaces on the Great Festivals—so named from the threefold invocation of the Deity, Holy, Holy, Holy: also called *Sanctus* and *Seraphic Hymn;* sometimes incorrectly called Trisagion (q.v.).

TERSCHELLING, *tèr-schĕl'lĭng:* one of the chain of islands n. of Holland, in 53° 24′ n. lat.; 45 sq. m. The principal villages are Oosterschelling, Westerschelling, and Midsland. T. consists of fertile arable and meadow lands; is protected on the s. by large dikes, and in other parts by downs, which are carefully preserved. There is a good haven, a ship-building yard, a woolen dyework, etc.—Pop. 3,128.

TERSE, a. *tèrs* [L. *tersus*, wiped off, clean, pp. of *tergĕrĕ*, to wipe, to polish: It. *terso*]: clearly written; concise and expressive—applied to style or language; in *OE.*, smooth: polished. Terse'ly, ad. *-lĭ*. Terse'ness, n. *-nĕs*, the state or quality of being terse; conciseness; brevity; neatness of style.—Syn. of 'terse': neat; concise; clear; compact.

TERTIAN, a. *tĕr'shăn* [L. *tertĭānus*, belonging to the third—from *tertĭus*, the third—from *tres*, three]: recurring every third day, as a certain fever: N. a fever whose paroxysms recur every third day, or every forty-eight hours (see AGUE).

TERTIARY, a. *tĕr'shĭ-ā-rĭ* [L. *tertĭārĭus*—from *tertĭus*, third—from *tres*, three]: third; pertaining to the third: N. in *geol.*, the third or upper great division of the stratified systems, as distinguished from mesozoic and paleozoic, formerly termed *secondary*, and the crystalline rocks, formerly named *primary*, but which, when found mostly metamorphic, surrender that name as a temporary one to the paleozoic. TERTIARY STRATA or SYSTEM, in *geol.*, the formations that occur above the Chalk till the beginning of the Drift. POST-TERTIARY SYSTEM [L. *post*, after]: the recent and superficial accumulations occurring since the Tertiary. It comprises the periods—known often by the term Quaternary (q.v.)—from the Glacial to the Recent or Human, inclusive.

The *Tertiary* occupies the s.e. of England, and both London and Paris are in basins of this age—the latter locality having afforded to Cuvier (q.v.) material that led to his fame in fossil osteology. The T., from its development of the higher animals, is called the Age of Mammals, of which class all the T. species are extinct. Lyell divided the T. into Eocene (q.v.), Miocene (q.v.), and Pliocene (q.v.). Some European geologists have given the name Oligocene (q.v.) to what others regard as upper Eocene and lower Miocene.—For the sub-divisions of the earliest and latest periods in the United States, with geographical extent and characteristic fossils, see the above titles. To these must be added the earlier Laramie or Lignite period, with deposits partly from brackish water—the beds generally unconformable to the overlying Eocene, and seemingly continuous below with the Cretaceous. They abound on the e. slope of the Rocky Mts. and in Wyo., Ut., and Colo., where, counting different deposits, they are several thousand ft. in total thickness, and afford lignite, mineral coal, and iron ore; they occur also in the upper Missouri region. Though classed with T., they are transitional, with a Cretaceous aspect in shells and T. in plants. Not all the lignite and coal of the w. and s. states are of this period. The Miocene beds appear furthest n. on the Atlantic coast at Martha's Vineyard, Mass., rising in the high bluff of Gayhead, which takes its name from the clays of all colors there—these containing whale vertebræ and large sharks' teeth. Other deposits of this age are found southward to S. C. In the Rocky Mt. region, the Miocene beds, like all the T. later than the Laramie group, are of fresh-water origin; the Cretaceous sea had given place to vast lakes, which became the cemeteries of brute life, the Eocene introducing abundant mammals. The Miocene had the 3-toed horse, Miohippus; a gigantic lion with sabre-like canine teeth, Machærodus; a rhinoceros in N. J.; a camel in Va.; the first beaver; and, besides whales, there are dolphins, seals, walruses, etc. In general, the climate of the T. was semi

tropical fauna, as indicated by palms, figs, cinnamon, and warm-climate animals in the upper Missouri region. Many extraordinary forms have been unearthed in the Rocky Mt. region within a few years, such as the 3-toed ungulate mammal *Dinoceras mirabile*, with 3 pairs of horns.

TERTIARY, *tĕr'shĭ-ā-rĭ*, in the Rom. Cath. Church: a member of the third order in a body of 'religious' persons who, without entering into the seclusion of a monastery, aspire to practice in ordinary life all the substantial obligations of the scheme of virtue supposed to be laid down in the gospel. The first institute of Tertiaries was the THIRD ORDER OF ST. FRANCIS (13th c.), followed in the same century by the Third Order of St. Dominic; and the example was in time followed by various other religious orders, e.g., Augustinians, Minims, Carmelites, Trappists. The rules of the Third Order of St. Francis were made public first in 1221. The associates must all be members of the church, and of good repute and blameless life. The intending members must restore all ill-gotten goods, must renounce all evil practices, and abandon all feuds and enmities with their neighbors. The obligation of a T. is irrevocable, unless the party should be released, or should enter into a more strict religious order. The members are required to renounce luxury, profane exercises and amusements, costly or unseemly dress, and the use of arms, except in the necessity of self-defense. They must frequent the sacraments, hear mass, if possible, daily; observe the fasts of the church, as well as certain special austerities; avoid contention, litigation, and unnecessary oaths; cultivate charity toward all, with special obligations toward needy, sick, or afflicted brethren, and practice with more than common fervor the great Christian virtues. The Tertiaries are placed under the authority of superiors elected at intervals and for a stated period, and are liable to an annual visitation, conducted by a priest appointed for the purpose. None of these obligations, however, are supposed to bind the members under pain of mortal sin.

The purpose of St. Francis was that the Tertiaries while living in the world should not be of the world. But, in time, Tertiaries aspired to the conventual life, and thus numerous congregations of Franciscan Tertiaries living in communities like regular friars or regular nuns sprang up in s. Europe. Many such congregations still exist, but the original rule of the institute has a great multitude of fellowers in the world. The Third Order of St. Domin. exists to-day only as a community institution; the lay brothers and the lay sisters living in convents and not in the world.

TERTULLIAN, *tĕr-tŭl'ĭ-an* (QUINTUS SEPTIMIUS FLORENS TERTULLIANUS, *kwĭn'tŭs sĕp-tĭm'ĭ-ŭs flō'rĕnz tĕr-tŭl-ĭ-ā'nŭs*): one of the church Fathers (see FATHERS OF THE CHURCH), and one of the earliest who used Latin in written compositions: dates of birth and death unknown: b. at Carthage, conjecturally between 150 and 160; d. conjecturally between 220 and 240. He was son of a pro

consular centurion—i.e., a centurion who attended on the proconsul. He was brought up a heathen, and from his own writings we learn that he was licentious in conduct and fond of the public shows. Of his heathen life nothing more is known. Eusebius describes him as a man exceedingly well acquainted with the laws of the Romans, and his writings bear out the assertion. He certainly received a good education. Some have identified him with one Tertullianus, whose name occurs in the index of the Pandects, and have supposed that he acted as an advocate; but the supposition is a mere conjecture. We know nothing of his conversion: it was probably between 190 and 195. He became a presbyter in the church in Carthage, and was married; and as his wife was a Christian, it is supposed that his marriage took place after his conversion. It is certain that he visited Rome, and was well acquainted with the Roman Church. After remaining a presbyter until he had reached middle age, he became a Montanist. Jerome attributes his adoption of Montanism to the insulting treatment which he received at the hands of the Roman clergy. But this is probably not an entirely accurate account of the matter. Jerome himself had been ill treated by the Roman clergy, and was therefore inclined to blame them; and in the character and general tendency of T.'s opinions, we have ample explanation of his passing over to Montanism. See MONTANUS. He lived to a good old age, remaining a Montanist to the last.

T. was a man of strong passions: he loved and hated with intensity. He was well versed in Roman law, in ancient philosophy, history, and poetry. He was not deficient in philosophical power; but in his intense desire for thoroughness in principles and in their practical application, he became narrow, bigoted, and uncharitable. He shows no sympathy with Greek speculation or with freedom of human thought; and he shows little sympathy with the joys and pleasures of man, being strongly inclined to asceticism. We need not wonder, therefore, that he came to believe in the Paraclete of Montanus as the revealer of the perfection of Christianity, and that he adopted the Montanist opinions that second marriages were adulteries and that it was unlawful to flee in times of persecution, and wrong to receive the lapsed back into the communion of the church. For Montanism, with its frightfully unbalanced thinking and its peril in practical life, was in its origin, as has been well said, an 'evangelical and legal reaction against the political and secular tendencies of the church.' From the church, which at the end of the 2d c. seemed to have diverged far from the great highway marked out for it by Christ and his apostles, men of moral earnestness easily separated themselves—mislead into vagaries in their indignant zeal.

His writings are numerous. Attempts have been made to divide them into those written before he became a Montanist and those written afterward; but the attempts have failed for in treating many subjects he would have no oc

casion to refer to the Paraclete, second marriages, or persecution.

His works are interesting, throwing much light on the internal circumstances of the church, on the social questions which perplexed Christians, on the opinions of heretics, and on the development of doctrine. Of his theology, Neander remarks: 'In Tertullian we find the first germ of that spirit which afterward appeared with more refinement and purity in Augustine, as from Augustine the scholastic theology proceeded, and in him also the Reformation found its point of connection.' Among Tertullian's peculiar opinions was his brief in the corporeality of the human soul.

His writings had great influence on the subsequent ages, but especially on Cyprian. Jerome says: 'I saw at Concordia, in Italy, an old man named Paulus. He said that, when young, he had met at Rome with an aged amanuensis of the blessed Cyprian, who told him that Cyprian never passed a day without reading some portion of Tertullian's works; and used frequently to say: *Give me my master*, meaning Tertullian.'

There are many editions of Tertullian; the best is by Franciscus Oehler (3 vols. 8vo. Leip. 1853): vol. III. contains the principal dissertations on his life and writings. His works, with many dissertations and notes, form the vols. I., II. of Migne's *Patrologia Latina.* A satisfactory account of Tertullian's life, writings, and opinions is in Bishop Kaye's *Ecclesiastical History of the Second and Third Centuries, Illustrated from the Writings of Tertullian* (8vo, 2d ed., Cambridge 1829); and in Neander's *Anti-gnosticus, or the Spirit of Tertullian,* transl. by J. E. Ryland. A good translation of Tertullian's works is in Clark's *Ante-Nicene Christian Library,* edited by Drs. Roberts and Donaldson.

TERZA-RIMA, n. *tërt'să-rē'mă* [It. *terza-rima,* a third or triple rhyme—from *terza,* third: *rima,* rhyme]: a complicated system of versification, borrowed by the early Italian poets from the troubadours. For an example in English, see Byron's *Prophecy of Dante.*

TERZETTO, n. *tërt sĕt'tō* [It. *terzetto,* a trio—from It. *terzo,* third—from L. *tertius,* third]: in *music,* a composition in three parts; a trio.

TESLA, *tĕs'lâ,* NIKOLA: electrician: b. Smiljan, Croatia, 1857. He studied at Carlstadt, and at the Polytechnic School in Gratz, Austria, and afterward at the Ecole Polytechnique, Paris. After graduating at Gratz (1881), he entered the telegraph service at Buda-Pest, where he became an expert in the construction of dynamos. He was engineer of the Edison station in Paris, and after removing to the United States (1886), he was employed at Edison's laboratory, near Orange, N. J., later settling in New York, where he opened a laboratory of his own for independent research. He soon made new experiments which resulted in surprising discoveries re-

garding the correlation of force and the method of transforming the electric current into light. He devised new mechanism for producing the alternating current, and was able to exhibit in New York, London, and Paris an aurora quite detached from his electrodes; one of his most remarkable productions being a luminous cloud, hanging in space, without any machinery being visible. The 50,000 horse-power plant built to transmit the water-power of Niagara Falls to Buffalo and other places is the outcome of his rotary field-motor invented 1888. It was stated he aimed to set matter into vibration at rate of 3,000,000 vibrations a second, and showed that electric lamps and motors can be operated without a circuit. Believing that by causing matter to reach a state of luminous vibration, quickly passing through the stage of heat vibration, it would cause light without heat, he set about developing his theory, and in the course of his experiments actually received a current of 200,000 volts in his body without injury. Tesla has suggested that the so-called X-rays, as well as the cathode rays, are not rays at all (i.e., etheric waves), but streams of particles of matter shot forth from the cathode surface, and of sufficient minuteness and momentum to traverse the interspaces between the molecules in the wall of the tube and other solid bodies; he has found that the metals, when ranged according to their powers of reflecting X-rays, correspond to the contact series of metals in air. In 1900, May 1, he patented a method of transmitting electrical energy without wires. In 1901, Tesla discovered that the capacity of the electrical conductor is variable. In the same year he announced the discovery of a method of transmitting wireless messages, to any distance, through the earth, which acts as a connecting medium between a transmitter and a receiver, and has spent many years in developing suitable apparatus.

TESSELLATE, v. *tĕs'sĕ-lāt* [L. *tessellātus*, furnished with small square stones or little cubes for paving—from *tessella*, a small cube, dim. of *tessĕra*, a squared block]: to form into squares or checkers; lay with checkered-work. TES'SELLATING, imp. TES'SELLATED, pp.: ADJ. formed in little squares or mosaic-work; covered with squares like a chess-board. TES'SELLA'TION, n. *-lā'shŭn*, mosaic-work; the operation of making mosaic-work. TES'SELLAR, n. *-lėr*, formed in little squares. TES'SELLITE, n. *-līt*, a mineral which exhibits a peculiar tessellated or mosaic-like structure.

TESSERA, n. *tĕs'sėr-ă*, TES'SERÆ, n. plu. *-ē* [L. *tessĕra*, a cube, a die—from Gr. *tessărĕs*, four]: small six-sided solid of marble, earthenware, glass, etc., used for tessellated pavements, ornamenting walls, etc.; in *anc. Rome*, a small square of anything used as a token or ticket. TES'SERAL, a. pertaining to or of the nature of tesseræ. TES'SULAR, a. *-sŭ-lėr*, cubical; having equal axes; in crystallography, isometrical.

TEST, n. *těst* [L. *testis*, a witness]: oath which British military and civil officers were obliged to take against Popery under the celebrated *Test Act* of Charles II.'s reign, repealed 1828 (see TEST ACTS): oath or affirmation generally. TEST'ABLE, a. *-ă-bl*, capable of being devised or given by will. TESTACY, n. *těst'a-sĭ*, in *law*, the state or condition of being testate, or of leaving a valid testament or will at death.

TEST, n. *těst* [L. *testa*, a shell]: the shell of the *Mollusca*, hence sometimes called *Testacea;* the calcareous case of echinoderms; the thick, leathery, outer tunic in the tunicata. See TESTA.

TEST, n. *těst* [OF. *test*, shell, test—from L. *testa*, earthen vessel, shell: It. *testo*, an earthen pitcher, a goldsmith's melting-pot]: the vessel in which a metal is tried; a cupel; any critical or crucial trial or examination; means of trial; anything used to distinguish substances or to detect their presence; standard; criterion; proof: V. to bring to a trial and examination; compare with a standard; prove by experiment; but to the proof; to refine, as gold or silver, by means of the test. TEST'ING, imp.: N. the act of trying for proof; the operation of refining gold or silver by the test (see TESTING). TEST'ED, pp. tried by a test. TEST'LESS, a. *-lĕs*, that cannot be tested. TESTING CLAUSE, in a *Scotch deed*, the last clause, narrating when and where the parties signed the deed, before what witnesses, the number of pages of which the deed consists, and the name of the person who penned it, as well as any erasures made in engrossing. It is an essential part of a Scotch deed. TEST-PAPER, in *chem.*, strip of paper impregnated with a reagent, used for detecting the presence of certain substances: it is made by dipping unsized paper into an alcoholic solution of a vegetable coloring matter which changes color when exposed to the action of an acid or alkaline solution. The paper, after being gently dried, is cut into slips of a suitable size. Hence, by dipping the appropriate test-papers into any solution, we can ascertain whether it is acid, alkaline, or neutral. Litmus and turmeric are most used as the coloring matters; litmus for detection of acid, alkaline, or neutral. Litmus and turmeric are most *chem.*, tube or glass for holding substances to be tested or analyzed.—SYN. of 'test, n.': standard; criterion; proof; trial; experiment; experience.

TESTA, n. *tĕs'tă*, TES'TÆ, n. plu. *-tē* [L. *testa*, a shell, a tile]: a shell; in *bot.*, the outer covering of the seed; the shell-like covering of certain animals. TESTACEANS, n. plu. *tĕs-tā'shănz*, or TESTA'CEA, n. plu. *-shĭ-ă*, a general name for those molluscous animals that are furnished with a shelly covering, as the oyster, periwinkle, etc. TESTACEL, n. *tĕs'tă-sĕl*, a little shell. TESTACEOUS, a. *tĕs-tă'shŭs*, pertaining to or composed of shells; having a hard shelly covering; shelly. TESTA'CEOL'OGY, n. *-sĕ-ŏl'ŏ-jĭ* [Gr. *logos*, a discourse]: the science of conchology.

TEST ACTS, otherwise called CORPORATION ACTS: two English statutes imposing certain oaths on the holders of public offices. Act 13 Car. II. c. 2, directed that all magistrates should take the oaths of allegiance and supremacy, as well as an oath renouncing the doctrine that it is lawful to take arms against the king; and provides that they must receive the communion according to the rites of the Church of England within a year before their election. Act 25 Car. II. c. 1, imposed like conditions on the holders of all public offices, civil and military, and obliged them in addition to abjure belief in the doctrine of transubstantiation. These acts, which were practically evaded by means of an act of indemnity passed every year, were repealed by 9 Geo. IV. c. 17, so far as regarded the administration of the sacrament, for which a declaration set forth in that act was substituted. A statute of William IV. substituted a declaration for an oath in most government offices. A new form of oath has been substituted for the oaths of supremacy, allegiance, and abjuration by 21 and 22 Vict. c. 48. See ABJURATION, OATH OF; OATH.

TESTAMENT, n. *tĕs'tă-mĕnt* [F. *testament*—from L. *testamentum*, a will—from *testor*, I bear witness to; *testis*, a witness: It. *testamento*]: a written document, properly attested, in which a person declares his pleasure as to the disposal of his property after his death; a Will (q.v.); one of the two great divisions of the Holy Scriptures, as the Old Testament, the New Testament (see BIBLE). TES'TAMENT'ARY, a. *-mĕnt'ĕr-ĭ*, pertaining to a will; bequeathed or devised by a will; contained in a will. TES'TAMENT'AL, a. *-ăl*, pertaining to a will; testamentary.

TESTAMENTS OF THE TWELVE PATRIARCHS: name given to twelve connected writings, which claim to report the last words and counsels of the twelve sons of Jacob, containing prophetic visions, biblical biographies, and Christian passages. Apart from such interpolations, these testaments are Jewish writings, Aramaic or Hebrew originally. Fragments have recently been brought to light from the Cairo genizah. Discoveries of such fragments explain the many Semitisms of the Greek text and prove that the latter is a paraphrase of an Aramaic midrash, with frequent Christian interpolations. Sinker has issued a critical edition, based on a 10th century Cambridge manuscript (1869). Prof. Charles is preparing a new critical edition with complete equipment of Semitic texts, Greek codices, and the old Armenian and Slavonic versions.

TESTAMUR, n. *tĕs-tā'mĕr* [L., we testify—from *testor*, I testify]: a certificate of having successfully passed a certain examination—so named from the Latin word which begins it; a certificate given by an English university or a church dignitary.

TESTATE, a. *tĕs'tāt* [L. *testātus*, having made a will

—from *testāri*, to provide for by will]: having made and left a will; disposed of by will: N. one who has left a will at death. TESTATOR, n. *tĕs-tā'tėr* [L.]: a man who makes a will. TESTA'TRIX, n. *-trĭks* [L.]: a woman who makes a will.

TESTATUM, *tĕs-tā'tŭm:* the Witnessing or Operative part of an English deed: it begins with the words, 'Now this indenture witnesseth that,' etc.; and includes a statement of the consideration-money and the receipt thereof.

TESTER, n. *tĕs'tėr* [OF. *testiere*, the head-piece of anything, crown of a hat—from *teste*, the head—from L. *testa*, a skull, a shell]: a flat canopy over anything, e.g., bed, pulpit, tomb, etc.; called also TESTOON: an OF. and OE. coin, value about sixpence—named from the stamp of the sovereign's head on one side; a sixpence. TES'TERN, v. *-tėrn*, in *OE.*, to give a tester to: N. in *OE.*, a sixpence. HALF-TESTER, a canopy which extends but a short distance over the head.

TESTICLE, n. *tĕs'tĭ-kl* [L. *testic'ŭlus*, testicle, a dim. from *testis*, a testicle—probably the same as *testis*, a witness, that is, a proof of virility: It. *testicolo*]: one of the two genital glands of the male in which the spermatozoa and some other of the constituents of the semen are formed; a testis. The term is also applied to either of the posterior tubercles of the optic lobes or corpora quadrigemina. The testicle proper lies in the scrotum, is of an oval form, and is mostly invested with a pouch or closed sac of serous membrane, the tunica vaginalis, derived from the peritoneum during the descent of the gland in the fœtus from the abdomen into the scrotum. The organ consists of a central portion or body, an upper enlarged extremity, the globus major or head, and a lower extremity, the globus minor or tail. Lying upon the posterior border of the testicle is a long narrow flattened body, the epididymis. To this border is attached the spermatic cord, composed of arteries, veins, lymphatics, and nerves, connected together by areolar tissues and invested with fasciæ. This cord ends in the internal abdominal ring. It is accompanied by the vas deferens, the excretory duct of the testis (a continuation of the epididymis), which passes through the ring into the pelvis to the base of the bladder, where it unites with the duct of the vesicula seminalis to form the ejaculatory duct, which terminates in a slit-like orifice in the prostatic portion of the urethra. Underneath the tunica vaginalis is the tunica albuginea, or fibrous covering of the testicle, and beneath this coat is the tunica vasculosa, or vascular tunic, composed of a plexus of blood vessels held together by delicate areolar tissue. The glandular structure of the testis consists of from 250 to 400 lobules, each composed of from one to three or more minute convoluted tubes, the tubuli seminiferi. These tubules unite into larger tubes, which carry the seminal fluid from the testis to the epididymis. The testicle is subject to

hypertrophy, atrophy, injuries, acute or chronic inflammation, cystic diseases, fibroma, malignant disease, and neuralgia. Inflammation of the testicle (orchitis), as that of the epididymis (epididymitis, q.v.), is usually attended with much pain and swelling and a feeling of weight and great discomfort. The use of a properly fitting suspensory bandage affords much relief; but the treatment of diseases or disorders of the testicle should be entrusted to a physician. TESTICULATE, a. *tĕs-tĭk'ū-lāt,* or TESTIC'ULATED, a. *-ĕd,* or TESTIC'ULAR, a. *-ū-lėr,* in *bot.,* shaped like or resembling a testicle; having two oblong tubercles, as a root.

TESTIFY, v. *tĕs'tĭ-fī* [L. *testificor,* I bear witness—from *testis,* a witness; *facĭō,* I make: It. *testificare*]: to state or declare on oath; publish and declare freely; give evidence or testimony; to bear witness. TES'TIFYING, imp. TES'TIFIED, pp. *-fīd.* TES'TIFICATION, n. *-fĭ-kā'shŭn,* the act of giving testimony or evidence. TES'TIFICA'TOR, n. *-tėr,* one who gives evidence. TES'TIFI'ER, n. *-ėr,* one who testifies.

TESTILY, TESTINESS. See under TESTY.

TESTIMONIUM, *tĕs-tĭ-mō'nĭ-ŭm:* the Attestation Clause of a deed or legal instrument, beginning with the words, 'In witness whereof,' and stating that the party signed the deed. See TESTING CLAUSE, under TEST.

TESTIMONY, n. *tĕs'tĭ-mō'nĭ* [L. *testĭmōnĭum,* witness, evidence—from *testis,* a witness]: evidence; a solemn declaration or affirmation for the purpose of establishing or proving some fact; declaration; representation; open attestation; manifestation; in *Scrip.,* the tables or book of the law; the gospel; the Word of God: V. in *OE.,* to witness. TES'TIMON'YING, imp. *-mō'nĭ-ĭng.* TES'TIMONIED, pp. *-mŭn-ĭd.* TES'TIMO'NIAL, n. *-mō'nĭ-ăl,* a written certificate in favor of one's conduct, qualifications, or abilities; a certificate of merit, worth, genuineness, or the like; something presented as an acknowledgment of an individual's public services, or as a token of respect for his private worth.—SYN. of 'testimony, n.': proof; attestation; witness; evidence; corroboration; confirmation; affirmation.

TEST'ING, in Chemistry: series of processes, involving many details: it may be regarded as equivalent to qualitative analysis. As a simple illustration of the process of testing, whose full presentation cannot here be given, we will assume that the most common of all chemical compounds, a salt, is submitted for examination. The student must pursue some such course as the following: 1. He must examine the dry substance before the blow-pipe, and note whether (*a*) it is volatile, as are the salts of ammonia and mercury; or (*b*) fusible, as are the salts of potash and soda; or (*c*) infusible, as are the salts of zinc, alumina, magnesia, lime, strontia, and baryta; or (*d*) reducible, as are the salts of silver, tin,

lead, bismuth, antimony, and cadmium; and (*c*) whether it gives a coloration to the borax bead, and what that color is. 2. Having made his blow-pipe examination, he must bring his substance to a finely divided state, and dissolve it, if possible, in water, or if insoluble in that fluid even with the aid of heat, then in hydrochloric or nitric acid. The solution, whether in water or acid, to which no test or reagent has been applied, is termed by Odling and others *the original solution;* and to this are added various tests, such as sulphuretted hydrogen, hydrosulphate of ammonia, ammonia, nitrate of silver, etc. The most common effect resulting from addition of a gaseous or liquid reagent is to cause a *precipitate* or solid deposit of either the base or acid sought for. These precipitates differ in color, consistency, etc.; and the student must note not only the color of the precipitate (the most important point), but also whether the deposit is crystalline, gelatinous, clotty, etc. 3. He must then ascertain to which group the base that he is seeking belongs. There are three great groups of bases; the members of the first group being precipitated from their acid or acidified solutions by sulphuretted hydrogen (hydrosulphuric acid); those of the second group not being thrown down by this reagent, but being precipitated from neutral solutions by hydrosulphate of ammonia (sulphide of ammonium); while those of the third group are not thrown down by either of these reagents. The first group includes tin, arsenic, antimony, bismuth, mercury, lead, silver, copper, and cadmium; the second, nickel, cobalt, manganese, iron, chromium, aluminum, and zinc; the third, barium, strontium, calcium, magnesium, potassium, sodium, and ammonia. 4. Having ascertained to which base the group belongs, the next point is to identify it: for information on this point, see standard works on qualitative analysis or on practical chemistry. 5. The base being thus determined, it remains to determine the acid; and in this the student will be much assisted by a knowledge of the solubility of the most important classes of salts. Knowing, e.g., the insolubility of the sulphates of baryta and strontia, he need not search for sulphuric acid in a soluble salt of one of these earths. On the other hand, a salt insoluble in water is not likely to be a nitrate, or chlorate, or acetate, or chloride (the only chlorides insoluble in water being chloride of silver and calomel). We cannot enter into the testing for acids further than to observe that the nitrates and chlorates deflagrate; the tartrates and citrates char; the carbonates effervesce when acted on by an acid more energetic than carbonic acid; the silicates, borates, and benzoates are precipitated by hydrochloric acid; and the arseniates and chromates react with hydrosulphuric acid. The presence of any particular acid is more or less indicated by its behavior, while still in union with the base, with strong sulphuric acid, which in many cases causes evolution of characteristic fumes or vapors; and among tests especial-

ly applicable for detection of the acids (in acid solutions) are solutions of nitrate of baryta, nitrate of silver, chloride of calcium, and perchloride of iron. As the above remarks apply merely to the detection of the base and acid contained in a single salt, it is evident how much the difficulties are increased when there is a mixture of several salts; or where, instead of a metallic oxide, a vegetable base is present; or where we have to deal with a complicated mixture of organic and inorganic substances—e.g., in investigating the contents of the stomach in a case of suspected poisoning.—The following works on the subject may be referred to: Fresenius's *Qualitative Analysis;* Noad's *Qualitative Analysis;* Greville Williams's *Outlines of Chemical Manipulation;* Bowman's *Practical Chemistry;* Odling's *Practical Chemistry.*

TESTRIL, n. *tĕs-trĭl* [see TESTER]: in *OE.*, a sixpence.

TESTUDO, n. *tĕs-tū'dō* [L. *testūdo,* a tortoise, or covering like it—from *testa,* a shell]: in *anc. Rome,* a protective covering or screen of overlapping shields formed by soldiers advancing in close array to the attack, and resembling somewhat the back of a tortoise: also, a machine moving on wheels and roofed, under which soldiers worked in undermining or destroying the walls of a besieged place (see BATTERING RAM): in *med.,* a broad soft tumor, called also a *talpa.* TESTU'DINAL, a. *-dĭ-năl,* pertaining to the tortoise or resembling it. TESTU'DINATE, a. *-nāt,* or TESTU'DINATED, a. *-nā-tĕd,* shaped like the back of a tortoise; vaulted; arched. TESTUDINEOUS, a. *tĕs'tū-dĭn'ē-ŭs,* resembling the shell of a tortoise.

TESTU'DO: typical genus of Testudinidæ. See TORTOISE.

TESTY, a. *tĕs'tĭ* [OF. *testu,* testy, headstrong—from OF. *teste;* F. *tête,* the head—from L. *testa,* a skull, a shell]: fretful; peevish; easily irritated; petulant. TES'TILY, ad. *-tĭ-lĭ.* TES'TINESS, n. *-nĕs,* ill-nature; petulance; peevishness.

TETANUS, n. *tĕt'ă-nŭs* [L. *tetănus:* Gr. *tetănos,* a stiffness or spasm of the neck—from Gr. *teinō,* I stretch]: disease characterized by violent and continued contraction or spasms of the muscles, resulting in rigidity and incurvations of various parts; the disease called lockjaw. TETANIC, a. *tĕ-tăn'ĭk,* pert. to or of the nature of tetanus: N. a medicine which acts on the nerves, and through them on the muscles. TETANOID, a. *tĕt'ă-noyd* [Gr. *eidos,* resemblance]: resembling tetanus.—*Tetanus* is one of the most formidable diseases of the nervous system, and is characterized by an involuntary, persistent, intense, and painful contraction or cramp (see SPASM) of more or less extensive groups of the voluntary muscles, nearly the whole body being sometimes affected. There is usually some degree of order in which the different sets of muscles are affected. The muscles of the

neck, jaws, and throat are almost always the first to evince the disease. In four cases, perhaps, out of five, the disease begins with stiffness and closure of the jaws (*trismus* or *lock-jaw*), so that this last is the popular name for the disease. With this symptom, or very soon after it, the muscles concerned in swallowing become affected; and the spasm extends to the muscles of the trunk and of the extremities. There is often severe pain behind the lower end of the sternum, which extends through to the back. This is due, doubtless, to spasmodic contraction of the diaphragm. The muscles that are affected remain permanently contracted till either recovery or death ensues; and some of them, e.g., the muscles of the abdomen, seem as rigid as a board, when struck by the fingers: a perfect remission of the spasm scarcely ever occurs, except sometimes during sleep. Exacerbations of the spasms, on the other hand, generally occur every 10 or 15 minutes, beginning usually by an increase of the pain at the sternum, and lasting two or three minutes; and as the disease advances, these paroxysms become more frequent. The powerful muscles of the back generally overcome the muscles in front; and when this is marked, the result is that the patient during the paroxysms rests solely on his head and heels, while his body is raised in an arched form (*opisthotonos*). Occasionally the muscular contraction predominates in the opposite direction, and brings the head and knees in contact; more rarely, the body is bent to one side.

The disease is due to poisoning of the nerve centres by a toxin elaborated by the tetanus bacillus—a rod-shaped micro-organism with a rounded extremity, resembling a round-headed pin. This bacillus is found in the soil in many places, especially in the neighborhood of barns and in country roads. It gains entrance into a wound with the dirt, and if the wound is neglected, or is of a suitable character, the bacillus begins soon to develop and to produce the poison upon whose action the symptoms of the disease depend. The bacillus cannot grow in a part freely exposed to the air, hence the specially dangerous wounds, so far as the complication with tetanus is concerned, are punctured and ragged wounds in which are many pockets away from the air in which the germs may grow. The disease is especially liable to occur after the lacerated and dirt-contaminated wounds received by boys in Fourth of July accidents. It may also appear without any apparent wound, after exposure to cold and wet, but in such cases the probability is that the bacilli have gained entrance to the tissues through some unnoticed prick or scratch of the skin, or possibly a slight injury of the mucous membrane of the mouth.

The interval between the reception of the injury and the first tetanic symptoms usually varies from 4 to 14 days, and rarely exceeds 22 days, some time in the second week being the most common period. As a general

rule, the more rapidly the disease comes on, the more fatal will be the result.

Mere *trismus* or lock-law may be induced by affections of the teeth, especially by difficult dentition of the wisdom-teeth; but this is a purely local affection, in which the muscular contraction, though persistent, is never increased by painful spasmodic paroxysms, and which usually disappears on the removal of the exciting cause; and the general knowledge of this fact may tend to remove unnecessary terrors. Hysteria sometimes mimics the phenomena of tetanus with marvellous fidelity; and hydrophobia and tetanus have been mistaken for each other, in consequence of the spasm of tetanus sometimes affecting the muscles of deglutition and inducing a fear of swallowing. The symptoms of tetanus are also imitated in strychnine poisoning; for this drug, or nux vomica, from which it is derived, acts upon the nerve centres in almost exactly the same way as the toxin of the tetanus bacillus.

It is much easier to prevent the disease than to cure it. It should be the rule, especially in regions where tetanus is common, to cleanse all wounds, especially punctures and jagged wounds, and expose all parts of them freely to the air. Fourth of July wounds in particular should be carefully explored and all powder, dirt, wadding, etc., thoroughly removed and all recesses washed out repeatedly with a strong antiseptic solution and with peroxide of hydrogen. If the wound is deep and ragged, it should be opened up by wide incisions, and if necessary cauterized. Tetanus antitoxin is useful as a preventive, if given before any of the signs appear, or just as the stiffness begins to be noticed, but it is less serviceable in the way of cure after the disease is fully developed.

For the peculiar form of tetanus that occurs in newly-born children, see TRISMUS NASCENTIUM.

TETANUS, or LOCK-JAW, occurs in most of the domesticated animals, but most frequently in horses and sheep: it is produced usually by cold and wet, by intestinal worms, obstinate constipation, or injuries. The symptoms usually come on gradually, involving most of the muscular structures, which become hard and rigid; the nose is protruded, the limbs move stiffly, the tail is upraised, the bowels are constipated. The animal must be kept perfectly quiet, and in an airy but moderately warm place; and plentifully supplied with cold water, and with soft but moderately nutritive food, which he will usually greedily suck in through his firmly-closed teeth. A full dose of purgative medicine must at once be given; extract of belladonna twice or thrice daily is occasionally serviceable; any discoverable wound or injury should be fomented or poulticed; bleeding, sedatives, and all causes of irritation must be avoided. In adult animals, most cases are fatal; but among young animals, especial-

ly when the attack results from exposure to cold, many recoveries occur.

TETCHY, TETCHINESS, TETCHILY. See TECHY.

TÊTE, n. *tāt* [F. *tête*, the head—from L. *testa*, a skull, a shell]: false hair; a front or wig. TETE-À-TETE, n. *tāt'â-tāt'* [F., head to head]: private conversation; familiar interview or conference; a kind of sofa: ADJ. confidential; familiar; private: AD. face to face, familiarly. TETE'DU-PONT', *-dŭ-pŏng'* [F., the head of the bridge]: in *fort.*, any work or system of works thrown up at the end of a bridge in order to cover the communication across a river. See BRIDGE-HEAD.

TETHER, n. *tĕth'ėr* [Icel. *tjodra*, to tether: Sw. *tjuder;* Low Ger. *tider*, a tether: Gael. *teadhair*, a tether]: a rope or chain by which an animal is confined to certain limits while grazing; anything by which one is restrained: V. to confine by a rope; to restrain within certain limits. TETH'ERING, imp. TETH'ERED, pp. *-ėrd.* LENGTH OF ONE'S TETHER, the extreme limits to which one can go.

TETHYS, n. *tē'thĭs* [L.—from Gr. *Tēthus*]: in Gr. *myth.*, the greatest of the sea-deities, wife of Oceanus, daughter of Uranus and Terra, and mother of the chief rivers of the universe, Nile, Peneus, Simois, Scamander, etc., and of about three thousand daughters called Oceanides. The name Tethys is said to signify nurse.—In *astron.*, Tethys is the name of a satellite of Saturn.

TETRA-, *tĕt'ră* [Gr. *tetra*, a prefix—from *tettāres*, four]: a common prefix in scientific and technical terms, signifying 'four'; fourfold; four times.

TETRABRANCHIATA, n. plu. *tĕt'ră-brăng-kĭ-ā'tă* [Gr. *tetra*, four; *brangchĭa*, gills]: an order of the Cephalopoda, including the pearly nautilus, characterized by having four gills. TET'RABRAN'CHIATE, a. *-kĭ-āt*, having four gills.

TETRACHORD, n. *tĕt'ră-kawrd* [Gr. *tetra*, four; *chordē*, a chord]: in *anc. music*, a series of four tones of which the first and last continued a fourth; an instrument with four strings.

TETRACOCCOUS, a. *tĕt-ră-kŏk'kŭs* [Gr. *tetra*, four; *kokkus*, a kernel]: in *bot.*, having four cells elastically dehiscing and separating.

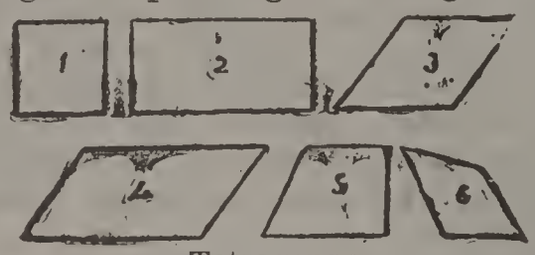
TETRAD, n. *tĕt'răd* [Gr. *tetras* or *tetrada*, the number four]: the number four; four of anything taken collectively; in *chem.*, an element of four equivalents.

TETRADYMITE, n. *tĕ-trăd'ĭ-mīt* [Gr. *tetradumos*, fourfold—from *tetra*, four]: a mineral, sulpho-telluride of bismuth, so called from the quadruple macles in which its crystals usually appear.

TETRADYNAMOUS, a. *tĕt'ră-dĭn'ă-mŭs*, or TET'RADYNA'MIAN, a. *-dĭ-nā'mĭ-ăn* [Gr. *tetra*, four; *dunămis*, power, strength]: in *bot.*, having six stamens, four of

which are uniformly longer than the others; of the class TET'RADYNA'MIA, n. *-nă'mĭ-ă.*

TETRAGON, n. *tĕt'ră-gŏn* [Gr. *tetra,* four; *gōnĭa,* a corner, an angle]: a plain figure having four angles, as a



Tetragons:
1, Square. 2, Parallelogram or Oblong. 3, Rhombus. 4, Rhomboid. 5 and 6, Trapezium.

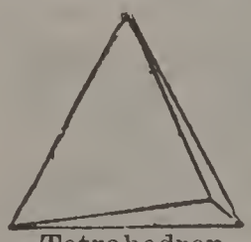
square, a rhombus, etc.; a quadrilateral. TETRAGONAL, a. *tĕ-trăg'ō-năl,* having four angles and sides. TETRAGONOUS, a. *tĕ-trăg'ō-nŭs,* tetragonal.

TETRAGONIACEÆ, *tĕt-ra-gō'nĭ-ā'sē-ē:* formerly a natural order of exogenous plants, but now included in *Ficoideæ,* to which belongs the genus *Mesembrianthemum,* from which the genus *Tetragonia* differs chiefly in lack of petals. The species are herbaceous plants or small shrubs, with alternate, thick, succulent leaves. A few are found on Mediterranean shores, and some in Asia and the South Sea Islands; but the order abounds chiefly in southern Africa. New Zealand Spinach belongs to this order.

TETRAGRAM, n. *tĕt'ră-grăm* [prefix *tetra-;* Gr. *gramma,* a line]: word of four letters; in *geom.,* figure formed by four right lines. TETRAGRAM'MATON, n. *-ma-tŏn* [Gr. *to tetragrammaton,* the word of four letters; *tetragrammatos,* of four letters—prefix, *tetra-; gramma, grammatos,* a letter]: the sacred Hebrew name of the Deity (Y H V H—representing Yahveh or Jehovah); from the fact that that name, being deemed too sacred to be uttered, was distinguished by such expressions as, 'the name,' 'the name of four letters,' etc.

TETRAGINIAN, a. *tĕt'ră-jĭn'ĭ-an,* or TETRAGYNOUS, a. *tĕ-trăj'ĭ-nŭs* [Gr. *tetra,* four; *gunē,* a woman]: in *bot.,* having four carpels or four styles; of the class TET'RAGYNIA, n. *-jĭn'ĭ-ă.*

TETRAHEDRON, n. *tĕt'ră-hē'drŏn* [Gr. *tetra,* four; *hĕdra,* a seat, a base]: solid figure having four triangular faces (in the regular tetrahedron, which is one of the five regular solids, the faces are equal equilateral triangles); a form assumed by some crystals, and in crystallography considered a secondary form of the Octahedron (q.v.), produced by removing the alternate angles or edges of the latter. TET'RAHE'DRAL, a. *-drăl,* bounded by four equilateral and equal triangles. TETRAHEDRITE, n. *tĕt'ră-hē'drīt,* a sulphide of copper and antimony; gray copper ore; fahl ore.


Tetrahedron.

TETRAHEXAHEDRON, n. *tĕt'rā-hĕks'ā-hē'drŏn* [Gr. *tetra*, four; *hex*, six; *hedra*, a seat or base]: in *crystals*, a solid bounded by twenty-four equal faces, four corresponding to each face of the cube. TET'RAHEX'AHE'-DRAL, a. *-hē'drăl*, exhibiting four ranges of faces one above another, each range containing six faces.

Tetrahexahedron.

TETRALOGY, n. *tĕ-trăl'ŏ-jĭ* [Gr. *tetralog'ĭa*—from *tetra*, four; *logos*, a word]: in the *Gr. drama*, a group of four dramas—three tragedies, and one satiric play (or sometimes four tragedies)—exhibited for the prize at the festivals of Dionysus.

TETRAMEROUS, a. *tĕ-trăm'ĕr-ŭs* [Gr. *tetra*, four: *mĕros*, a part]: in *bot.*, composed of four parts, or in fours or multiples of four.

TETRAMETER, n. *tĕ-trăm'ĕ-tĕr* [Gr. *tetra*, four; *metron*, a measure]: a verse consisting of four measures.

TETRANDROUS, a. *tĕ-trăn'drŭs*, or TETRAN'DRIAN, a. *-drĭ-ăn* [Gr. *tetra*, four; *anēr* or *andra*, a man]: having four stamens; of the class TETRAN'DRIA, n. *-drĭ-ă*.

TET'RAO AND TETRAON'IDÆ: see GROUSE.

TETRAPETALOUS, a. *tĕt'rā-pĕt'ā-lŭs* [Gr. *tetra*, four; *petălon*, a leaf]: in *bot.*, containing four distinct petals or flower-leaves.

TETRAPHYLLOUS, a. *tĕt'rā-fĭl'lŭs* [Gr. *tetra*, four; *phullon*, a leaf]: in *bot.*, having four leaves.

TETRAPLA, n. *tĕt'rā-plā* [Gr. *tetraplous*, fourfold]: an edition of the Bible in four languages: specifically, an edition containing four different Greek versions arranged in parallel columns by Origen, one of the ancient fathers.

TETRAPOLITAN CONFES'SION, *tĕt-ra-pŏl'ĭ-tan:* formula of Protestant orthodoxy offered to Emperor Charles V. at Augsburg 1530, June 24, as a substitute for the 'Augustan Confession' or Confession of Augsburg (q.v.). The representatives of the four cities, Constance, Lindau, Memmingen, Strasbourg, declined to subscribe that confession because of its teaching with regard to the Lord's Supper, and therefore presented to the emperor and the diet their own confession of faith, called *Tetrapolitan* as expressing the belief of the 4 cities [Gr. *tetra-* (*tessares*, *tet tares*), four, and *polis*, city]. The T. C. was written by Capito and Bucer. It contained 23 articles. The difference in doctrine between the T. C. and the Augustan was inconsiderable and concerned the Eucharist. It laid more stress on the authority of the Bible than does the Augustan Confession.

TETRAPTEROUS, a. *tĕ-trăp'tĕr-ŭs* [Gr. *tetra*, four; *pteron*, a wing or a fin]: having four wings. TETRAP'-TERAN, n. *-ăn*, an insect having four wings.

TETRAQUETROUS, a. *tĕt'rā-kĕt'rŭs* [Gr. *tetra*, four; L. *quadra*, a square]: in *bot.*, having four angles, the faces being concave.

TETRARCH, n. *tĕt'rârk* [Gr. *tetrar'chēs*—from *tetra*, four; *archein*, to be first, to rule]: governor of the fourth part of a Roman province; later, any petty prince or sovereign. TET'RARCHATE, n. *-râr-kāt*, or TET'RARCHY, n. *-kĭ*, district governed by a tetrarch; the office or jurisdiction of tetrarch. TETRARCHICAL, a. *tĕt-râr'kĭ-kăl*, pertaining to a tetrarchy.—*Tetrarch*, in the usage of the later Roman empire, denoted any minor ruler, especially in the East, possessing sovereign rights within his territory, but dependent on the emperor, and in many cases removable at his pleasure. This was the case especially in Syria, where the princes of the family of Herod are called indiscriminately by this title (Lk. iii. 1) and by that of king (Matt. xiv. 9). The T. in this latter sense was in truth a sovereign, though a dependent sovereign; and there are instances in which the title seems to have been applied to really independent sovereigns of small principalities.

TETRASPERMOUS, a. *tĕt'ră-spĕr'mŭs* [Gr. *tetra*, four; *sperma*, seed]: in *bot.*, having four seeds.

TETRASPORE, n. *tĕt'ră-spōr* [Gr. *tetra*, four; *sporos*, a seed]: among the *algæ* or seaweeds, a spore formed by the division of a mother-cell into four.

TETRASTICH, n. *tĕ-trăs'tĭk* [Gr. *tetra*, four; *stichos*, a row, a verse]: an epigram or stanza of four verses.

TETRASTYLE, n. *tĕt'ră-stīl* [Gr. *tetra*, four; *stulos*, a

Tetrastyle Temple, Fortuna Virilis.

column]: in *anc. arch.*, a building with four columns in front: ADJ. pertaining to or resembling a tetrastyle.

TETRASYLLABLE, n. *tĕt'ră-sĭl'lă-bl* [Gr. *tetra*, four, and Eng. *syllable*]: a word of four syllables. TET'RASYLLAB'IC, a. *-sĭl-lăb'ĭk*, or TET'RASYLLAB'ICAL, a. *-lăb'ĭ-kăl* consisting of or having four syllables.

TETRATHECAL, a. *tĕt'ră-thē'kăl* [Gr. *tetra*, four; *thēke* a case]: in *bot.*, having four loculaments or thecæ.

TETRAVALENT, a. *tĕ-trăv'ă-lĕnt* [Gr. *tetra*, four; L. *valens* or *valen'tem*, prevailing—from *valēre*, to prevail]: in *chem.*, applied to elements which combine with four atoms of hydrogen, e.g., carbon.

TETTER, n. *tĕt'tĕr* [Icel. *titra;* Bav. *tattern;* Ger. *zittern*, to tremble: Ger. *zittermal*, a tetter]: in *med.*, a cutaneous disease accompanied with redness and itching (see PSORIASIS: HERPES): V. to affect with disease called tetter. TET'TERING, imp. TET'TERED, pp. *-tĕrd*. TET'TEROUS, a. *-tĕr-ŭs*, having the character of tetter.

TETUAN, *tĕt-ô-ân':* seaport-town (and small province) of Morocco, on the n. coast of Africa: the town is about 9 m. inland, 22 m. s. of Ceuta, 40 m. s. of Gibraltar; area of prov. 914 sq. m. The town is surrounded by walls, flanked with towers, and defended by a castle. Its harbor does not admit large vessels; but a brisk trade is carried on in wool, silk, girdles, leather, cotton, etc., and it exports provisions largely to Ceuta. Oranges are grown in great abundance in the vicinity, and are exported to Spain, Gibraltar, Oran, and England. T. was taken by the Spaniards under O'Donnell (q.v.) 1860, but was evacuated next year. In a year, more than 200 vessels, of 2,000 to 3,000 tons burden, entered the port of Tetuan.—Pop. of town estimated about 20,000.

TETZEL, or TEZEL, *tĕt'sĕl* (properly *Diez* or *Diezel*), JOHN: known in connection with the controversy regarding indulgences, out of which the Reformation took its rise: between 1450 and 60—1519, Aug.; b. Leipzig. T. studied in the univ.; entered the Dominican convent of St. Paul 1489; and soon gained reputation as an effective preacher. His personal character is a subject of controversy. The questions as to the teaching of T. are more important. His ability as a preacher led to his being intrusted with the charge of preaching an indulgence, first on behalf of the Teutonic Knights; afterward 1516 on the far more momentous occasion of the famous indulgence published in favor of contributors to the fund for building the church of St. Peter's at Rome. In this work it cannot be doubted that T. went to extremes which it is impossible to justify; but the worst charges, especially that of preaching the efficacy of indulgences without repentance, and of offering anticipatory pardons for future sin, are strongly denied by Rom. Cath. writers as being contradicted by contemporary authorities and by the instructions in his official commission. Much of the obloquy which he drew upon his cause was produced by the pomp and apparent luxury in which he travelled on his mission. It was in opposition to the preaching of T. that Martin Luther published his celebrated theses 1517, Oct. 31. T. replied first by publicly burning these obnoxious propositions; but he afterward published a series of counter-theses (burned in retaliation by the students of the Univ. of Wittenberg), and 1518, May, a detailed reply to Luther's celebrated Sermon on Indulgences. On the arrival of the papal delegate Miltitz T. addressed to him a letter in reply to the charges of his adversaries; nevertheless he was summoned before Miltitz in Leipzig in Jan. following, and received a severe rebuke for his excesses in language and improprieties in proceeding, which had brought scandal on the church. He was required to withdraw to his convent at Leipzig, where he died in the same year.—See on one side, Hechlein, *Vita Tezelii;* Hofmann, *Lebensbeschreibung Tetzel's* (1844); on the other, Gröne, *T. und Luther* (1853). See also Kayser *Geschichtsquellen über T.* (1877).

TEUCER, *tū'sėr:* in Hellenic legend, first king of Ilium, after whom the Trojans are called Teucri.—Another Teucer is named in Homer; he was son of Telamon, King of Salamis, and accompanied his step-brother Ajax to the Trojan war. Returning home after the fall of Ilium, Telamon refused to receive him because he had not avenged Ajax, and Teucer settled in Cyprus, and founded there a kingdom.

TEUFFEL, *toĭf'fĕl,* BLANCHE WILLIS HOWARD, BARONESS VON: American novelist: b. Bangor, Me., 1847, July 21; d. Munich, Germany, 1898, Oct. 7. She was educated in New York, but in 1878 she removed to Stuttgart, Germany, where she engaged in teaching and also edited for several years a magazine printed in English. She was married to Baron von Teuffel in 1890. Her publications include a book of travel, *One Year Abroad* (1877), and among her novels are: *One Summer* (1875); *Aunt Serena* (1886); *No Heroes,* a story for boys (1893); *Seven on the Highway,* short stories (1897); etc.; and her works published posthumously are *Dionysius the Weaver's Heart's Dearest* (1899), and *Garden of Eden* (1900).

TEU'TOBURGER WALD (L. *Teutobergiensis Saltus*): Germany, in Westphalia, a series of wooded hills, which begin on the left bank of the Diemel, near Warburg, and passes northward in the direction of Driburg, then northwest toward Orlinghausen, Bielefeld and Halle, finally Lengerich and Tecklenburg, and disappear in broken hills near Bevergern. Under the name of Egge (q.v.), they are steep and high and appear like a long wall; the highest point is Völmerstod (1,400 feet). There are, however, two lower parallel ranges. The second part is the Lippische Wald (q.v.), also called Osning, believed by some authorities to be the real Teutobürger Wald. The third section includes the Ravensburg, Osnabrücken and Tecklenburg Mountains. The name is taken from Tacitus' annals, where an account is given of the defeat of the Roman general Quinctilius Varus by Arminius in the 1st c. A.D. The Hermann monument on the Grotenburg commemorates this victory.

TEUTONIC, a. *tū-tŏn'ĭk:* pert. to the *Teutons* or *Teutŏnēs* (see below): N. language of the Teutons, parent of a group of European languages. *Teutonic languages* are divided into three great divisions—1, Low German, including Mœso-Gothic, Old Saxon, English, Dutch, Frisian, Flemish; 2, Scandinavian, including Icelandic, Swedish, Danish, Norwegian, and Ferroic (spoken in the Faröe Islands); 3, High German, which includes modern German (see further, PHILOLOGY—table of languages). TEU'TONS, name by which the Germans designate themselves. TEUTON'ICISM, n. *-ĭ-sĭzm,* a Teutonic idiom or expression; a Germanism. TEU'TONIZE, v. *-īz,* to make Teutonic or German; to make conformable to German idioms or analogies; to conform to German customs, idioms, etc. —*Teutonic* is an epithet applied to a group of nations,

as well as of languages, forming an important division or stem of the Aryan family. See PHILOLOGY. The Teutonic stock of nations, as they exist at the present day, is divided into two principal branches: (1) the Scandinavian, embracing Danes, Swedes, Norwegians, Icelanders; (2) the Germanic, which includes, besides the German-speaking inhabitants of Germany proper (see GERMANY) and Switzerland, also the population of the Netherlands (the Dutch), the Flemings of Belgium, and descendants of the Anglo-Saxons in Great Britain; with their offspring in North America, Australia, and various British colonies. It is necessary in this case, as in all similar cases, to guard against making language the sole test of race. In many parts of Germany where German now prevails, Slavic dialects were spoken till recent times, and in some places are not yet quite extinct; and, in Great Britain, it is unreasonable to suppose that the Anglo-Saxon invaders exterminated the native Celtic population, or even drove more than a tithe of them into the Highlands. The mass undoubtedly remained as serfs, learned the language and customs of their masters, and gradually amalgamated with them; so that, in blood, the English are perhaps as much Celtic as Teutonic.

Of the various tribes and nations spoken of as inhabiting n. Europe in ancient times, it is often difficult to determine which were really of Germanic race, and which Celtic or Slavic: the classic writers, having no skill in detecting the affinities of language, had only confused notions of ethnology. Of undoubted German nations which took part in the destruction of the Roman empire, the most prominent were the Goths, Lombards, Vandals, and Franks. The term Teutonic is derived from *Teutones,* name of a nation or tribe mentioned first by Pytheas, who wrote about B.C. 320, as then inhabiting a part of the Cimbric Chersonesus, or Jutland. For the next 200 years there is no mention of the Teutons. B.C. 113 they reappear in history as ravaging Gaul, and, in conjunction with the Cimbri and Ambrones, threatening the very existence of the Roman republic. The Cimbri having gone into Spain, the Teutones and Ambrones were at length defeated by Caius Marius in a great battle at Aquæ Sextiæ, or Aix, in Gaul, B.C. 102, in which 100,000 to 200,000 of the invading army were slain, and many thousands made prisoners. A similar victory was gained by Marius in the following year over the Cimbri in the plains of Lombardy. It is disputed among ethnologists and historians whether the Cimbri so defeated were of Celtic or Germanic race; and doubts have been thrown even on the claim of the Teutons to be considered Germans, though the best German scholars deem the claim established. Be that as it may, Roman writers after Cæsar and Tacitus, began to use the adjective Teutonicus as equivalent to Germanicus; and this practice was adopted in the middle ages by Germans writing in Latin.

TEUTONIC KNIGHTS: one of the famous military religious orders to which the Crusades gave rise. The sufferings of the Christian soldiers at the siege of Acre excited the sympathy of certain merchants of Bremen and Lübeck, who rendered such important services, by erection of hospitals and otherwise, that Duke Frederick of Swabia, with the sanction of Pope Clement III. and Emperor Henry VI., enrolled them in an order of knighthood, as the T. K. of St. Mary of Jerusalem. Only Germans of noble birth were admissible to the order, the founders having probably been ennobled before being enrolled. At first all members were laymen, but priests were soon admitted as chaplains; and there was added, about 1221, a class of half-brothers similar to the serving-brothers of the Templars and Hospitallers. The habit of the order was a white mantle with a black cross; and the knights took vows of poverty and chastity, which in later times were not strictly interpreted. Their first seat was Acre. On the overthrow of the kingdom of Jerusalem, the grand master removed to Venice, and thence 1309 to Marienburg, on the banks of the Vistula. In 1237 this order became united with the Brethren of the Sword in Livonia. In the 13th c. the Teutonic Knights were, with the sanction of the pope, engaged in a bloody war to enforce Christianity on the heathen nations inhabiting the s. shores of the Baltic, which resulted in the acquisition by the order of Prussia, Livonia, Courland, and adjoining territories. Warriors from all parts of Europe in that and the following century joined their standard, including Henry IV. of England, accompanied by 300 attendant knights and men-at-arms. The conquests of the order raised it to the rank of a sovereign power, with territory extending from the Oder to the Baltic, and comprising a population of between two and three millions, the grand master having his seat at Marienburg in Prussia. The decline of the order began in the 15th c., and its fall was due partly to internal dissensions, partly to attacks by neighboring states. Sigismund of Poland wrested W. Prussia from the knights; and Albert of Brandenburg, who was chosen grand master in hopes of his aiding the order against Poland, ended an unsuccessful war with Sigismund by an arrangement according to which the territories of the order in E. Prussia were formed into a duchy, to be held by Albert and his successors. Mergentheim in Swabia then became the seat of the grand master, who was recognized as a spiritual prince of the empire. At the peace of Presburg 1805, the emperor of Austria obtained the rights and revenues of the grand master; but 1809 the order was abolished by Napoleon, its lands passing to the sovereigns in whose dominions they lay. The Teutonic order, however, still preserves a titular existence in Austria.

TEW, v. *tū* [AS. *tawian;* Dut. *touwen*, to taw or dress leather (see TAW)]: to prepare by working; beat or dress as leather or hemp; in *OE.*, to pull about. TEW'ING, imp. TEWED, pp. *tūd.* TEW'TAW, v. *-taw*, to beat so as to soften as skins or flax.

TEWFIK, *tū'fĭk*, I., Khedive of Egypt: 1852, Nov. 19 —1892, Jan. 7 (reigned 1879–1892); son of Khedive Ismail. On the forced abdication of his father 1879, he succeeded to the viceroyalty of Egypt by a decree of the sultan of Turkey, based on the imperial firman of 1866 which changed the law of succession, except for which his uncle Halim would have succeeded. At the time of his father's abdication he was pres. of the council. The principal event of his reign was the insurrection raised by Arab Pasha 1882. He was favorable to British policy and influence, was married to one wife, was beloved by his people, and was a model Egyptian ruler. He was succeeded by his eldest son, ABBAS PASHA, b. 1874.

TEWKESBURY, *tūks'bĕr-ĭ:* ancient municipal borough of Gloucestershire, England; in the vale of Evesham, on the Avon, near its confluence with the Severn; 10 m. n.e. of Gloucester, 126 m. n.w. of London. The elaborate and magnificent parish church, an ancient edifice in Norman, is the most noteworthy architectural feature. Hosiery, shoes, nails, leather, and malt are manufactured; and T. is the centre of extensive carrying-trade on the Avon and Severn.—T., a very ancient town, appears to be of Saxon origin. Within half a mile of it was fought 1471, May 14, the famous battle of T., in which the Yorkists under Edward IV. and Richard III. inflicted signal defeat on the Lancastrians. Pop. (1900) 3,683.

TEWKESBURY, MASS., post-village in T. township (town), Middlesex co., Mass., on the Boston & Maine R.R. It is 5 m. e. s.e. of Lowell and 22 m. n.w. of Boston. T. contains the villages of Wigginville, Phœnix, and N. Tewkesbury. There is a high school and several graded schools at T., also a public library and a state almshouse. The principal industries are agriculture and the manufacture of machinery for the making of cotton goods. The town was incorporated in 1734. It stands between the Merrimac and Concord rivers and has a population of 3,750.

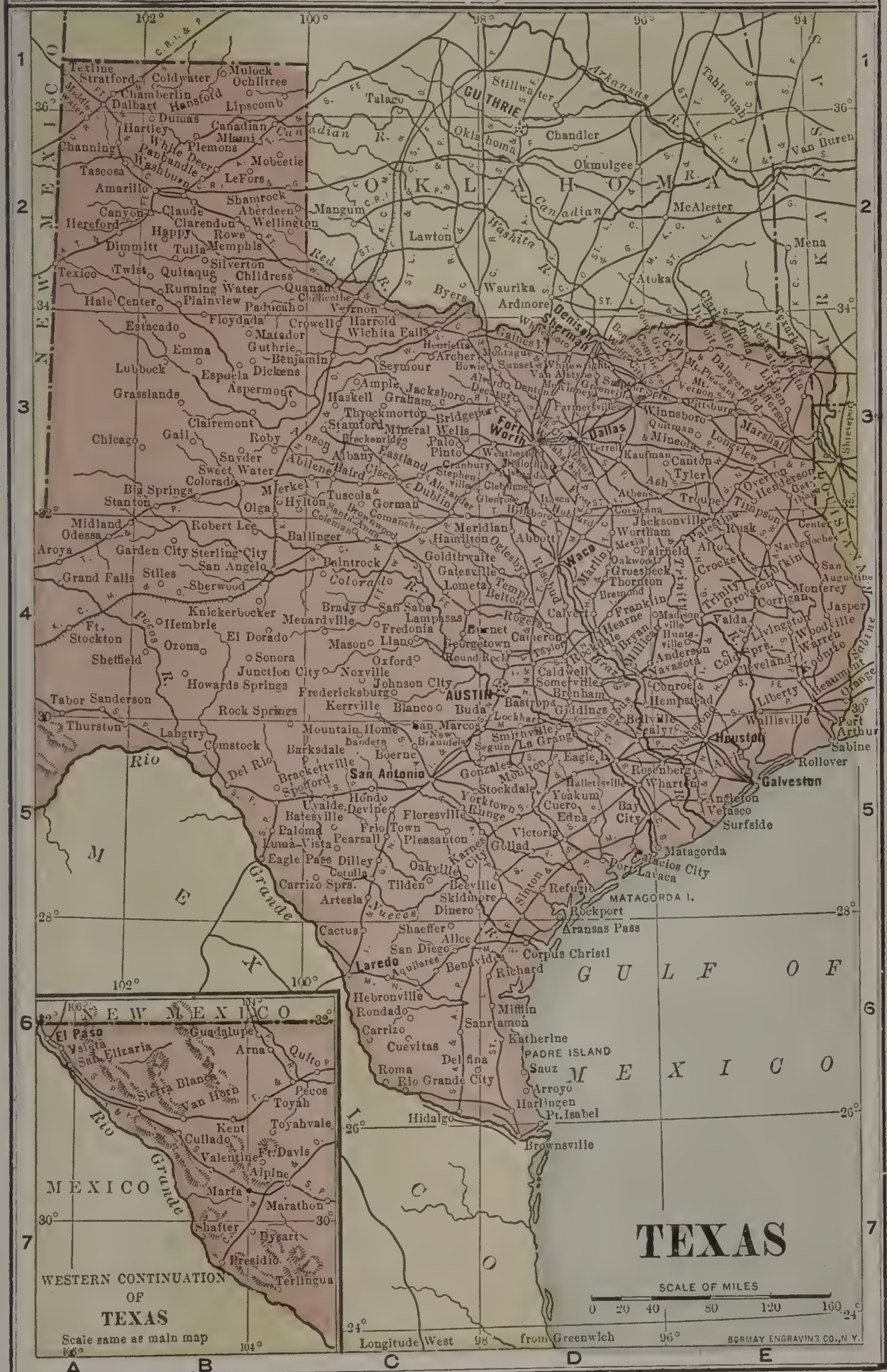
TEXARKANA, *tĕks-âr-kăn'a:* a municipality composed of adjacent cities, one being the capital of Miller co., Arkansas, the other of Bowie co., Texas. It is located 180 m. s.w. of Little Rock, Ark., and 28 m. n. of the boundary of Louisiana. T. embraces the two cities, is one community, industrially, and in all other ways except for city government. It is in an agricultural and lumber region, its chief industries being represented in the railroads, railroad shops and lumber works. The former employs some 1,500 men; the latter 500 men. Other factories give work to 2,500 men, including foundries and machine shops, cotton compressing, cotton-seed oil works, lumber, furniture, etc. Large shipments of cotton and cotton products, lumber, grain and live stock are constantly being made. Two U. S. Dist. Courts are held at T There are more than 30 churches, several high and other schools, libraries, hospitals and other municipal institutions. Pop. (1910) part in Ark. 5,655, part in Texas, 9,790 = 15,445.

TEXAS, *tĕk'as:* state; one of the United States of America; 15th in order of admission into the Union; ranking (1910) 1st in area, 3d in railroad mileage and in live-stock on ranges and 5th in population; popularly known as the 'Lone Star State.'

Location and Area.—T. is in lat. 25° 51′—36° 30″ n., long. 93° 27′—106° 43′ w.; bounded n. by Indian Terr.; e. by Ark. and La., s. by the Gulf of Mexico and the Mexican republic, w. by Mexico and N. Mex.; extreme length s.e. to n.w. 825 m.; extreme breadth 740 m.; water surface 2,510 sq. m., land surface 250,004 sq. m.; gross area 252,514 sq. m. (161,608,960 acres); gulf coast line 400 m.; cap. Austin. It is 6 times larger than N. Y.; 7 times as large as O.; 100,000 sq. m. larger than all the Middle and New Eng. states including Del. and Md.; and has 62,000 sq. m. more than Germany.

Topography.—T. is locally divided into central, n., s., e., and w. T. East T. is marked by a long range of hills running irregularly n.e. to s.w.; also by a heavy forest growth, principally of pine, oak, and hickory. The gulf region is bordered by an almost continuous chain of islands and by peninsulas having the same trend as the islands, the gulf border of the chain forming a regular line s.w. from the mouth of the Sabine river to near Corpus Christi, and thence with a course s. and slightly s.e. to Mexico. E. of the timber region and n. of the gulf coast is a vast open plain, with gently rolling prairies and gradual elevations, covered with luxuriant growth of native grasses, and extending to the Red river on the n. and to the mountain ranges on the w. and n.w. In this region the water-courses are generally bordered by hackberry, ash, elm, cottonwood, pecan, walnut, and various oaks. W. and n.w. of this region are the principal hills and mountain ranges of the state. In the extreme n.w., bordering Kan. and N. Mex., is an elevated table-land, formerly known as the *Llano Estacado* (Staked Plains—q.v.), and now as the 'Panhandle of Texas,' which is one of the best agricultural and stock-raising districts in the country. On a line n. of Austin and San Antonio, and running s.w., is a low range of hills that mark a change in the topography of the region. W. of this the surface is more broken, and the elevations are more abrupt. The valleys are broad, and the lands very fertile. T. claims a greater variety and richness of soil than any other state in the Union. Black waxy, black sandy, black pebbly, hog-wallow, gray sandy, red sandy, sandy loam, and alluvial soils are found in the state, and the majority of them in greater or less quantities in each division. The Brazos river bottoms are regarded as the most valuable in the state, for fertility and comparative immunity from overflows. The lower Brazos is in the heart of the sugar-growing belt.—The principal rivers are the Brazos, which drains about 35,000 sq. m., and is about 900 m. long; the Red, which drains about 29,000 sq. m.; the

Area in Square Miles, 265,780. Population, 3,048,710.
Number of Counties, 238. Capital of State, Austin.


TEXAS
SCALE OF MILES
0 20 40 80 120 160
Longitude West 98 from Greenwich
BORMAY ENGRAVING CO., N.Y.
GULF OF MEXICO
OKLAHOMA
NEW MEXICO
ARKANSAS
LOUISIANA
MEXICO
Texline
Stratford
Coldwater
Mulock
Ochiltree
Chamberlin
Dalhart
Hansford
Lipscomb
Dumas
Hartley
Canadian
Miami
Channing
Plemons
Mobeetie
Tascosa
LeFors
Amarillo
Shamrock
Canyon
Claude
Aberdeen
Hereford
Clarendon
Wellington
Happy
Rowe
Dimmitt
Tulia
Memphis
Silverton
Texico
Twist
Quitaque
Childress
Running Water
Quanah
Hale Center
Plainview
Paducah
Chillicothe
Vernon
Estacado
Floydada
Crowell
Harrold
Matador
Wichita Falls
Emma
Guthrie
Benjamin
Lubbock
Espuela
Dickens
Seymour
Aspermont
Grasslands
Haskell
Graham
Throckmorton
Clairemont
Stamford
Mineral Wells
Chicago
Gail
Roby
Breckenridge
Palo Pinto
Snyder
Abilene
Baird
Cisco
Sweet Water
Colorado
Merkel
Big Springs
Stanton
Hylton
Tuscola
Gorman
Olga
Comanche
Midland
Robert Lee
Odessa
Ballinger
Aroya
Garden City
Sterling City
San Angelo
Grand Falls
Stiles
Sherwood
Paintrock
Knickerbocker
Menardville
Brady
San Saba
Hembrie
Ft. Stockton
Ozona
El Dorado
Fredonia
Sheffield
Sonora
Mason
Llano
Junction City
Noxville
Oxford
Howards Springs
Johnson City
Fredericksburg
Tabor
Sanderson
Rock Springs
Kerrville
Blanco
Buda
Thurston
Langtry
Comstock
Mountain Home
Bandera
Barksdale
Boerne
Brackettville
Spofford
Del Rio
Uvalde
Hondo
Devine
Batesville
Paloma
Frio Town
Luna Vista
Pearsall
Eagle Pass
Dilley
Cotulla
Carrizo Sprs.
Tilden
Artesia
Cactus
Shaffer
Allce
San Diego
Laredo
Aquilares
Hebronville
Rondado
Carrizo
Cuevitas
Roma
Rio Grande City
Hidalgo
Brownsville
Harlingen
Pt. Isabel
Arroyo
Sauz
PADRE ISLAND
Katherine
Sanramon
Mirlin
Richard
Corpus Christi
Aransas Pass
Rockport
MATAGORDA I.
Refugio
Skidmore
Dinero
Beeville
Oakville
Karnes City
Gollad
Victoria
Edna
Cuero
Yoakum
Yorktown
Runge
Floresville
Pleasanton
Stockdale
Gonzales
Moulton
Seguin
La Grange
Eagle L.
Hallettsville
Rosenberg
Wharton
Angleton
Velasco
Surfside
Bay City
Matagorda
Palacios City
Port Lavaca
Galveston
Rollover
Port Arthur
Sabine
Beaumont
Orange
Liberty
Wallisville
Houston
Bellville
Sealy
Hempstead
Conroe
Anderson
Navasota
Huntsville
Madisonville
Hearne
Franklin
Bryan
Milliken
Calvert
Rockdale
Thorndale
Taylor
Cameron
Rogers
Belton
Temple
Lampasas
Burnet
Georgetown
Round Rock
Lockhart
Bastrop
Giddings
Caldwell
Somerville
Brenham
AUSTIN
San Marcos
New Braunfels
Smithville
Waco
Groesbeck
Oakwood
Fairfield
Mexia
Wortham
Jacksonville
Palestine
Rusk
Alto
Crockett
Lufkin
Nacogdoches
San Augustine
Center
Henderson
Overton
Tyler
Troupe
Timpson
Longview
Marshall
Jasper
Livingston
Woodville
Warren
Cleveland
Coldspr.
Trinity
Groveton
Corrigan
Monterey
Valda
Ash
Kaufman
Canton
Terrell
Dallas
Fort Worth
Weatherford
Granbury
Stephenville
Cleburne
Glenrose
Hillsboro
Hubbard
Ennis
Waxahachie
Mineola
Quitman
Winnsboro
Pittsburg
Mt. Pleasant
Mt. Vernon
Sulphur Spr.
Greenville
Farmersville
McKinney
Van Alstyne
Sherman
Denison
Bonham
Paris
Clarksville
Texarkana
Atlanta
Jefferson
Linden
Mineola
Mena
Atoka
McAlester
Van Buren
Tahlequah
Muskogee
Stillwater
Guthrie
Chandler
Okmulgee
Tulsa
Lawton
Byers
Waurika
Ardmore
Gainesville
Denton
Decatur
Bridgeport
Jacksboro
Ambler
Alvord
Seymour
Bowie
Sunset
Archer
Henrietta
Montague
Wichita Falls
Harrold
Vernon
Chillicothe
Quanah
Paducah
Crowell
Matador
Floydada
Estacado
Lubbock
Espuela
Dickens
Aspermont
Grasslands
Haskell
Throckmorton
Stamford
Mineral Wells
Breckenridge
Palo Pinto
Eastland
Cisco
Baird
Abilene
Albany
Anson
Roby
Snyder
Sweet Water
Colorado
Merkel
Big Springs
Stanton
Olga
Hylton
Tuscola
Gorman
Comanche
Brownwood
Coleman
Santa Anna
Ballinger
Robert Lee
Midland
Odessa

Colorado, which drains 25,000 sq. m., and is more than 900 m. long; the Trinity, drainage 17,000 sq. m., length 550 m.; the Sabine, drainage 17,000 sq. m., navigable about 300 m.; the Nueces, drainage with tributaries 16,000 sq. m.; the Rio Grande, navigable 450 m. from the Gulf, drainage on the T. side about 18,000 sq. m.; the Pecos, drainage 6,000 sq. m.; and the Guadaloupe and Neches rivers. All the principal rivers flow s.e. and empty into the Gulf of Mexico, except the Red river, which flows e. to the Mississippi. The largest lake is Sabine, 18 m. long and 9 wide, and the chief bays are Galveston, Metagorda, San Antonio, Aransas, Corpus Christi, and Copano.

Climate.—The prevailing wind throughout the state is the s. wind from the Gulf, with an occasional 'norther' in Nov.—Feb., when a wet 'norther' usually lasts 24 hours, and a dry one 48. The dry ones are highly appreciated, as they drive away all miasmatic poison. N. of the parallel of 29° 40′ the mean annual temperature decreases from 68° to 55°, the latter in the Pan-Handle region; s. of that parallel it increases from 68° to 75°, the latter at Brownsville. The rainfall varies from 12–16 in. in the Pan-Handle to 20 in. along the Pecos river, 37 in. at San Antonio, and 54·47 at Galveston.

Geology.—The alluvial, tertiary, cretaceous, and carboniferous are the principal formations in the state; and there are many economic properties, some of which are already advantageously developed. The coal measures comprise two basins of bituminous and one of lignite. The first bituminous field extends from the Red river to Burnet co. on the s., with its w. boundary in Kimble, Menard, and other cos. lying n. This basin has 9 seams of coal, covers parts of 25 cos., contains 12,000 sq. m. of the coal formation, and, it is believed, will yield 2,000,000—3,000,000 tons per sq. m. The second basin is the Nueces, along the Rio Grande from Eagle Pass to Laredo, and contains both bituminous and lignite. A third unexamined basin is in Presidio co., between the Capote Mountains and the Rio Grande. The lignite belt extends over 52 cos., or across the state from the n.w. border to Webb co., and is 3–15 ft. thick. The lignite basin contains limonite and clay iron ores, of great richness, and many of them are practically free from phosphorus. The whole ore-bearing area of e. Tex. is estimated at 1,000 sq. m. In the Llano-Mason region there are magnetites and hematites, with some hydrated ores, and on the Rio Grande in the Trans-Pecos region are other deposits of good ore. Petroleum wells have been developed in Nacogdoches and Anderson cos., and there are surface indications of oil in Brown and surrounding cos. T. has three distinct copper districts: the n., comprising the Permian of Hardeman, Knox, and other cos. found in separate masses; the central or Llano district, showing gray and peacock copper, with gold or silver, or both, found in veins; and the Trans-Pecos region, from which large shipments of rich

ore are being made, particularly from the Diablo Mountains. Lead is found in Llano and Burnet cos. (galena), and in the Trans-Pecos region, carrying silver. Gypsum beds extend over a large part of the Abilene country, and as far n. as the Canadian river, but were not being worked 1901. The lignite basin contains large deposits of potters' clay, fire clays, and kaolin. Potteries, and fire-brick and tile works are in operation in several cos., and the kaolin of Edwards and Robertson cos. is highly esteemed. An excellent quality of Portland cement is manufactured from the chalk of the cretaceous area and the clays adjacent to them. East T. contains greensand marl mixed with lime, and glass sand abounds in many cos. The state is rich also in building-stones, having sandstones in various colors, limestones, granite, and white and variegated marbles. Manganese is found in Llano and Mason cos.; salt in wells, lakes, and rocks, in many places; natural gas exists in Burton and Sabine, and in McCulloch, Palo Pinto, Bexar, and other cos.; and gold and silver have been extracted from ores in central and west T., and in Llano, Presidio, and El Paso cos.—The state survey shows 35,537,967 acres of timber land in the state. Two irregular belts entering the state along the Red river in the n., and running s. across the prairie region are known as the 'cross timbers'; a belt extending from the Red river to the Brazos, about 135 m., with average width 10–15 m., is known as the 'lower cross timbers'; and another belt, leaving the Red river further n. than the 'lower cross,' dividing at Montague co., and with branches extending to the Brazos and into Erath co., is known as the 'upper cross timbers.' The principal woods are post and black-jack oaks, ash, hackberry, pecan, cottonwood, hickory, sweet and black gum, elm, long and short leaf pine, mesquite, and stunted cedar.

Zoology.—The w. and n.w. parts of the state abound in buffaloes, antelopes, wild Mexican horses, wolves, black bears, pumas, wild cats, lynx, deer, foxes, raccoons, opossums, peccaries, hares, and squirrels; game birds include wild turkey, wild duck, pheasant, brant, teal, quail, and snipe; the principal birds of prey are vultures, hawks, kites, heron, kingfishers, and flamingoes; black bass is the chief fresh-water fish, and a variety of salt-water fishes are found along the gulf coast and bays; and there are many kinds of snakes and insects.

Agriculture.—Nearly 125,000,000 acres of T. is given over to farm lands, the total value of all farm property, including live stock, being about $1,000,000,000. The principal crops are cotton, corn, wheat, oats, sweet potatoes, sugar, cotton-seed, hay, and forage.

Mining.—Mining has made great progress in the last decade, and promises still further development. The output of bituminous coal and lignite, of petroleum, of

silver, and of brick and tile made from local clays are all immensely valuable. Gypsum, cinnabar, granite, sandstone, and limestone are quarried very profitably.

Manufactures.—There are nearly 15,000 manufacturing establishments in T., with aggregate annual products worth over $200,000,000. Manufacturing is chiefly the result of the state's abundance of raw material, especially lumber, cotton, and wheat, the leading industries being those which are more or less dependent upon these materials.

Commerce and Transportation.—The principal exports are cotton, wool and hides, most of which are shipped from Galveston. The chief imports are manufactured articles used in the state, also coal and railroad material. The annual imports of merchandise at the five principal ports amount to about $7,000,000 and the exports to over $150,000,000. T. has a total steam railroad trackage of more than 12,500 miles, divided among many important roads, besides a street railway system.

Finance and Banking.—The total assessed valuation is about $2,500,000,000, the tax rate .40 per $1,000, and the bonded debt about $3,250,000. There are about 300 national banks and about 50 private banks, while Galveston, Fort Worth, Houston and Dallas all do extensive clearing house businesses.

Religion.—The strongest denominations in the state are the Baptist, Methodist, Roman Catholic, African Methodist, Disciples of Christ, Presbyterian Lutherans, and Protestant Episcopalians.

Education.—T. spends about $7,500,000 annually in the maintenance of its public schools, in which there are about 800,000 pupils enrolled, with almost 20,000 teachers. There are normal schools for both white and colored teachers, many private secondary schools, while the most important institutions for higher education include the University of T., the Agricultural and Mechanical College at Bryan, and Fort Worth, Baylor, Texas Christian, and Trinity Universities. There are also several large industrial schools and colleges and many schools for technical training. T. has the most richly endowed system of public education in the United States. The State Asylum for the Blind—the largest institution of its kind in the South—is a school rather than a permanent home, having a course of education which aims to make the inmates self-supporting.

History.—The earliest records relating to T. show a struggle between the French and Spaniards for possession of the region. In 1687 Sieur de la Salle made a landing in Metagorda Bay, believing it to be the mouth of the Mississippi river, built a fort on Levaca Bay or river, naming it Fort St. Louis, and established a small colony. Two or three years afterward Capt. Alonzo de

Leon, Spanish officer, established the mission of San Francisco at the same place, and a mission and trading post at Nacogdoches, despite the protest of Capt. de St. Denis, the French commander at Natchitoches, who by reason of La Salle's prior occupation, claimed the region for the king of France. From various causes both of these settlements were short-lived, though the Spaniards were maintaining strong colonies a considerable distance up the Rio Grande river. In 1714 the French made a second attempt to plant a colony, and Capt. de St. Denis, the younger, was sent by Gov. Crozat, of the province of La., to establish a settlement on the Rio Grande. The officer reached the river, was taken prisoner by the authorities of Coahuila, subsequently married a daughter of the Spanish commander at the mission of San Juan, and aided in establishing three Spanish missions within the present limits of T. Under the name of 'the new Philippines,' the region remained in the peaceful possession of the Spaniards till 1735, when a French colony on Red river was removed to T. The Spaniards protested, but failed to drive the French away, and at length acknowledged their right to the site of their settlement. Both parties had trouble with the Indians. From 1758, when the Indians massacred all the people at the mission of San Saba, all the missions and settlements declined in population and influence. In 1763 the rivalry between the French and the Spaniards was ended by the cession of the La. territory by France to Spain. In 1803 Spain receded the region to France, by whom it was sold to the United States the same year (see LOUISIANA, *History*). Then a controversy arose between Spain and the United States over the boundaries of the territory, which remained unsettled till 1819, when Spain ceded Fla. to the United States, and the latter guaranteed to Spain the territory that she claimed w. of the Sabine river. In the meantime the region comprising the present state of T. was the scene of much trouble from revolutionary parties and filibusters, and many lives were lost. Lafitte, the pirate, occupied Galveston Island, and established the town of Campeachy. By 1821, when Mexico became independent of Spain, T. had become nearly depopulated. In 1822 Stephen F. Austin (q.v.) planted a colony on land in T., selected from the grant previously made by the Spanish authorities to his father, and in 1823 the grant was confirmed. The colony grew rapidly, and no trouble occurred till the province of Coahuila was united to T. by the constitution of the Mexican republic 1824. The attempt to govern the united provinces, one wholly Mexican, the other almost wholly American, by Mexican laws and Mexican officers, placed the American colonists under great hardship, and was the beginning of the opposition that led to the independence of T., its admission into the American Union, and the war between Mexico and the United States. In 1830 Bustamente, who had made himself dictator of Mexico, forbade peo-

ple from the United States to enter T. as colonists; the colonists there attempted to separate from Coahuila, but failed through the actions of Santa Anna; a revolution broke out; and the govt. of Coahuila and T. was overthrown. A battle was fought at Gonzales 1835, Oct. 2; the Texans captured Goliad Oct. 9; another battle occurred at Concepcion, near San Antonio, Oct. 28; an independent provisional govt. was organized by the Texans Nov. 12; and by the capture of San Antonio de Bexar, Dec. 10, the Texans drove the last body of armed Mexicans from their territory. Soon afterward Santa Anna organized an army of 7,500 men, well supported with artillery and provisions, and marched toward San Antonio. Near it was the Alamo, a strong fort, garrisoned by 172 Texans, commanded by William B. Travis. Santa Anna began investing the place 1836, Feb. 3, and after bombarding it for 11 days, carried it by storm Mar. 6, and butchered the whole garrison, after losing 1,600 men of his own army. On the 27th following Santa Anna accepted the surrender of the Texan force at Goliad, under command of Col. James W. Fannin, and immediately murdered every one. While these events were in progress a declaration of independence was made 1836, Mar. 2, a provisional govt. was elected 16th, and a constitution adopted and signed 17th. Gen. Houston, commander-in-chief of the Texan army, retreated to the San Jacinto river, where, on Apr. 21, with 800 men, he fought the decisive battle of the war, defeating Santa Anna, who had twice the number of troops, killing 630, wounding 208, taking 730 prisoners, and capturing Santa Anna himself (on the following day). The independence of the Texan republic was recognized by the United States 1837, Mar., by France 1839, and by England, Holland, and Belgium 1840. The Texans maintained their republic till 1846, Feb. 19, when their govt. accepted the proposition for annexation to the United States and admission into the Union as a state, contained in an act of the U. S. congress 1845, Dec. 27.

In 1850, in consideration of $10,000,000 in bonds, the state ceded to the federal govt. its claim to all territory beyond its present limits. Immediately prior to the opening of the civil war, Gov. Houston was urged by the secessionists to call a special meeting of the legislature. He refused. An irregular convention was held, which was sanctioned by the legislature assembled under the governor's call 1861, Jan. 21. The convention reassembled Jan. 28, adopted an ordinance of secession Feb. 1, which the people ratified Feb. 23, and on Mar. 6 the office of gov. was declared vacant because Gov. Houston had refused to take the oath of allegiance to the Confederacy. On Feb. 18, Gen. David E. Twiggs, U.S.A., commanding the department of T., surrendered all the troops, forts, guns, ammunition, and stores to the Confederate authorities. Galveston was occupied by the federal troops 1862, Oct. 8, but was retaken by

the Confederates 1863, Jan. 1; and later in the year Brownsville and several other places in w. Texas were occupied by a Union army. The last battle of the war occurred in w. Texas 1865, May 13, and the last Confederate army, under Gen. Kirby Smith, surrendered in Texas on the 26th. In 1869 a new constitution was adopted and ratified; and 1870 the 14th and 15th amendments to the federal constitution were ratified, the state was readmitted to the Union, Mar 30, and its government was turned over to the civil authorities Apr. 16.

Government.—The executive authority is vested by the constitution (1876) in a governor, elected for 2 years; a lieutenant-governor, elected at the same time and for the same period; state treasurer, elected for 2 years; comptroller of public accounts, elected for 2 years; attorney-general, elected for 2 years; commissioner of general land office, elected for 2 years; superintendent of public instruction, elected for 2 years; secretary of state, appointed for 2 years; commissioner of agriculture, insurance, statistics, and history, appointed for 2 years; adjutant-general, appointed for 2 years; and superintendents of the various state institutions, all appointed for 2 years. The governor must be at least 30 years old, a citizen of the United States, or of Texas at the time of the adoption of its constitution, and have resided in the same for 5 years next preceding the election. He has both general and special veto powers, for he can disapprove parts or items in a bill without affecting the remainder, and can veto every bill passed by the legislature within the last 10 days of the session, by filing his objections with the secretary of state within 20 days after adjournment, and giving public notice thereof by proclamation. In all criminal cases, except treason and impeachment, he has power to grant reprieves, commutations, and pardons, and with the advice and consent of the senate has the pardoning power in cases of treason. The lieutenant-governor must have the same qualifications as the governor, is president of the senate, and has, when it is in committee of the whole, a right to debate and vote on all questions, and when the senate is equally divided, to give the casting vote.—The legislative authority is vested in a general assembly, comprising a senate of 31 members, a house of representatives of 128 members, senators elected for 4 years, representatives for 2 years, sessions biennial. Senators must be 26 years old, and residents of the state 5 years and of the district one year next preceding the election; and representatives must be 21 years old, and residents of the state 2 years, and of the county, city or town one year next preceding the election. Extra sessions of the legislature may be called by the governor at any time.—The judicial authority is vested in a supreme court of a chief justice and two associate justices, elected for 6 years, a criminal court of appeals, 5 civil courts of appeals, one for each district into which state is divided, who are appointed

NEW BRAUNFELS, TEXAS

and receive same salary as other judges; district courts (47) of one judge each, elected for 4 years; county courts of one judge each, elected for 2 years; and justices of the peace, etc. The procedure in actions at law is in many respects peculiar to the state on account of being a survival of early Spanish methods. Besides the courts mentioned, each county is divided into 4 commissioners' precincts, for the purpose of representation in the commissioners' court, which has general charge of county affairs; each precinct has one commissioner, elected for two years. Each county is further divided into not less than 4 nor more than 8 justices' precincts, each of which has a justice of the peace or magistrate, elected for 2 years. The supreme court has appellate jurisdiction only, coextensive with the limits of the state. It also has power to ascertain such matters of fact as may be necessary to the exercise of its authority. The court of appeals has appellate jurisdiction coextensive with the limits of the state in all criminal cases, and in all civil cases in which the county courts have original or appellate jurisdiction. The state is divided into 3 districts for holding U. S. district courts; the court in the e. district is held at Sherman, in the w. district at Austin, in the n. district at Dallas.

The state has records of the chief executives of Texas, as colony, province, republic, and state, covering the period from 1691 to 1897. Under Spain 1691-1822, there were 22 administrations; under Mexico 1822-35, there were 7. Since the separation from Mexico, the successive executives have been as follows:

Provisional Governor.

Henry Smith.....1835, Nov. 12—1836, Mar. 16

Presidents.

David G. Burnet.....1836, Mar. 18—Oct. 22
Samuel Houston.....1836, Oct. 22—1838, Dec.
Mirabeau B. Lamar.....1838—1840, Dec.
David G. Burnet (act'g.).....1840, Dec.—1841, Dec.
Samuel Houston.....1841, Dec.—1844, Dec.
Anson Jones.....1844, Dec.—1846, Feb. 19

State Governors.

J. P. Henderson....1846-47
George T. Wood....1847-49
P. H. Bell.....1849-53
Edward M. Pease...1853-57
H. G. Runnels.....1857-59
Samuel Houston....1859-61
Edward Clark (act'g.).1861
Francis R. Lubbock.1861-63
Pendleton Murray...1863-65
A. J. Hamilton (provis.).....1865-66
J. W. Throckmorton.1866-67
Edward M. Pease...1867-70
Edmund J. Davis...1870-74
Richard Coke.....1874-77
Richard B. Hubbard.1877-79
Oran M. Roberts....1879-83
John Ireland.....1883-87
Lawrence S. Ross...1887-91
James S. Hogg.....1891-95
Charles A. Culberson.1895-99
Joseph D. Sayers.1899-1903
S. W. T. Lanham...1903-07
T. M. Campbell...1907-09
O. B. Colquitt.....1909-

Politics.—State, congressional, and presidential elections are held on Tuesday after the first Monday in Nov. All persons under 21 years of age, idiots and lunatics, paupers supported by any county, persons convicted of any felony, and soldiers, marines, and seamen in the

service of the United States are excluded from voting. All other male citizens who have resided in the state one year next preceding the election and the last 6 months within the district or county where they offer to vote, are qualified electors. For presidential vote, see PRESIDENT AND VICE PRESIDENT, ELECTIONS OF.

Population.—(1850) white 154,034, free colored 397, slaves 58,161, total 212,592; (1860) white 420,891, free colored 355, slaves 182,566, total 604,215; (1870) white 564,700, colored 253,475, total 818,579; (1880) white 1,197,237, colored 395,640, total 1,591,749; (1890) 2,235,-523; (1900) 3,048,710; (1910) 3,896,542.

TEXAS AGRICULTURAL AND MECHANICAL COLLEGE: located at College Station, Brazos co., Texas. It was established in 1876, receiving 180,000 acres of land from the national government, in accordance with the land grant act of 1862. The government of the college is vested in a board of directors of eight members from different sections of the state, appointed by the governor for terms of six years. It offers four years' courses leading to the degree of B.S. in agriculture, horticulture, mechanical and civil engineering; there is also a course in veterinary science, and graduate work is provided for; in 1902 ten weeks' winter courses in stock-farming, dairying, and horticulture were added to the curriculum. These are designed to give practical instruction and training to those who cannot obtain a thorough college education; only men over 18 are admitted to these courses. The college farm and grounds contain over 2,000 acres, of which 350 are under cultivation. In 1902 a new chemical and veterinary science laboratory building was erected. The library contains 5,600 volumes; the students 467, and the faculty 28.

TEXAS CHRISTIAN UNIVERSITY: located at North Waco, Texas. It was founded as a private institution at Thorp's Springs, Texas, in 1875, and chartered under the name of Add-Ran College; in 1890 the college became the property of the Christian Church of Texas, and in 1895 it was moved to its present site, a suburb of the city of Waco, and the name was changed to Texas Christian University. The university now includes the following departments: (1) the Add-Ran college of arts and sciences; (2) the college of the Bible; (3) the college of business; (4) the college of music; (5) the school of oratory; (6) the school of art; (7) the preparatory school. The university is coeducational. There is a military department providing military drill; no secret societies are permitted, but the students maintain three literary societies and an athletic association. The campus contains 15 acres on high ground above the city; the buildings include the main building, the Young Ladies' Home, and Townsend Memorial Hall. The library contains 5,000 volumes; the students in all departments number 400, and the faculty 31.

TEXAS, UNIVERSITY OF: coeducational institution, organized 1883, with academic and law departments at Austin, medical and pharmaceutical at Galveston, and agricultural and mechanical at College Station. This institution is controlled by a board of regents consisting of eight members. There are five departments, viz.: Literature, Science and Art; Engineering; Law; Medicine; and summer schools. The degrees granted include A.B., B.L., and B.S. In 1903 it was decided to give the degree of A.B. for all undergraduate courses. There are special law degrees of LL.B. and LL.M., and a medical degree of M.D. The present student roll contains more than 2,400 names, and the faculty consists of 85 members. There are two summer schools attached to the university. The library contains more than 63,000 volumes, and the production fund is $1,363,225. The main university occupied as a campus the 40 acres originally set aside by the republic of Texas for a university, on which were three buildings, a chemical laboratory, a dormitory and restaurant, and an unfinished central building, used for lecture rooms, libraries, and laboratories.

TEXAS CATTLE-PLAGUE, or TEXAS FEVER, or SPANISH FEVER, or SPLENIC FEVER, etc. See CATTLE-PLAGUE.

TEXEL, *těks'ĕl,* THE: island in the province of N. Holland, separated from the Helder by a narrow strait, called the Marsdiep; containing about 35,000 acres of arable and pasture lands. Many sheep are kept, producing fine wool. Fishing, ship-building, grinding corn, etc., are sources of prosperity. There is much wealth in the island. The n. part is called Eijerland, or the egg-country, immense flocks of birds coming thither from Scandivania to deposit their eggs. Pop. of Texel about 6,400.

TEXT, n. *těkst* [F. *texte,* a text—from L. *textum,* that which is woven, a web—from *texo,* I weave]: that on which a commentary is written; the subject of a sermon or discourse, as a selected verse or passage of Scripture; a written composition or book, as distinguished from notes or comments; large round hand-writing used in the body or text of a manuscript, or of the kind first set to pupils learning to write; a particular type of letter, as German text. TEXTUAL, a. *těks'tū-ăl,* of the text; contained in the text; serving as a text. TEX'TUALLY, ad. *-lĭ.* TEX'TUALIST, n. *-ĭst,* one who adheres to the text; one ready in citing texts. TEX'TUARY, n. *-ĕr-ĭ,* one of a sect of Jews who rigidly adhere to the text of the Heb. Scriptures. TEXT-BOOK, book used by students as a standard or basis for a particular branch of study; selection of passages of Scripture arranged for reference.

TEXTILE, a. *těks'tĭl* [L. *tex'tĭlus,* woven, wrought—from *texo,* I weave]: woven; capable of being woven. TEXTORIAL, a. *těks-tō'rĭ-ăl,* belonging to weaving. TEXTILE FABRICS. See WEAVING.

TEXTURE, n. *tĕks'tūr* [F. *texture*—from L. *textūra*, a web, a construction—from *texo*, I weave]: the art of weaving; that which is woven; a web; disposition of the threads of a woven material; hence surface quality or structure in general. TEX'TURAL, a. *-tūr-ăl*, of or pert. to a texture, or characteristic of it.

TEZCUCO, *tĕs-kô'kō* ('place of detention'): ancient and decayed city of Mexico, on the e. shore of the lake of Tezcuco in the state of Mexico, 16 m. e.n.e. of the city of Mexico. In former times, it was cap. of a great state, and was the second city in Mexico. In the early part of the 15th c., Tezcuco rose to its greatest splendor; it then contained ranges of stately mansions, in which the nobles resided, and a magnificent and vast pile of buildings, which served as the royal residence and as public offices. Tezcuco is now a poor place, filled with heaps of rubbish and ruins. Pop. 5,000.

THACHER, *thăch'ėr*, JAMES: 1754, Feb. 14—1844, May 24; b. Barnstable, Mass.: physician. He studied medicine; was appointed surgeon's mate to Dr. John Warren at Cambridge 1775; served as surgeon in the army till the close of the revolution; and after the war settled at Plymouth. He was a member of the National Acad. of Arts and Sciences, and published *Military Journal of the Revolution* (1824); *Modern Practice of Physic* (1817); *American Medical Biography* (1828); *Essay on Demonology* (1831); and *History of the Town of Plymouth* (1832).

THACH'ER, PETER, D.D.: Congregational minister: 1752, Mar. 21—1802, Dec. 16; b. Milton, Mass. He graduated at Harvard 1769, was ordained at Malden 1770, had part in the constitutional convention 1780, was prominent in local learned societies and philanthropy; also as chaplain of the legislature 15 years, and as pastor of the Brattle St. Church in Boston 1785 till his death. He published a narrative of the battle of Bunker Hill, strictures on the power of churches in dismissing pastors (1783), memoirs of Dr. Boylston (1789), and an oration of some note against standing armies. His reputation was that of an orator and patriot.

THACH'ER, THOMAS: 1620, May 1—1678, Oct. 15; b. Salisbury, Eng.: son of the Rev. Peter T. He removed to Boston 1635; studied theol., and was ordained pastor of the First Church (Congl.) at Weymouth 1644, Jan. 2; returned to Boston 1664; and practiced medicine till 1669, Feb. 16, when he was chosen first pastor of the Old South Church in Boston. He published *A Brief Rule to Guide the Common People of New England How to Order Themselves and Theirs in the Small Pocks or Measels* (1677); and *A Fast of God's Chusing* (1674); and prepared a *Hebrew Lexicon*, never published.

THACKERAY, *thăk'ėr-ĭ*, WILLIAM MAKEPEACE: English novelist and satirist: 1811, July 18—1863, Dec. 24:

b. Calcutta; of a good old English family, represented about the middle of the 18th century by Thomas Thackeray, eminent scholar, head-master of Harrow. His father, Richmond, and grandfather were in the civil service of the East India Company, and from his father, who died in 1816, Thackeray inherited a considerable fortune. Many of the minor incidents and characters in his works show Thackeray's interest in the land of his birth. At the age of six years he was sent to England, catching a glimpse of Napoleon on the Island of St. Helena. After spending several happy years at a private school, first in Hampshire and later at Chiswick, to which he later paid his respects, he was placed, 1822, in the Charterhouse School, that ancient Carthusian foundation, which he loved to commemorate in his writings. It figures as Grey Friars in *The Newcomes* and there both Colonel Newcome and Clive studied, and within its walls the Colonel for the last time answered his *Adsum.* He next went to Trinity College, Cambridge, where he neglected his academic opportunities even more thoroughly than his hero Arthur Pendennis, leaving in 1830 without a degree. His four terms at the University were, however, rich in friendships, the closest of which, lasting uninterruptedly for the rest of his life, was with Edward FitzGerald. Other brilliant friends from that period were the Tennysons, Monckton, Milnes, Brookfield, Spedding, and Kinglake. During his undergraduate days Thackeray made his first literary attempts, in connection with *The Snob* and *The Gownsman,* two short-lived college literary journals, of the second of which no specimen has remained. His parody of the subject of the Chancellor's prize *Timbuctoo,* published in *The Snob* in 1829, is chiefly interesting because the gold medal was awarded that year to Alfred Tennyson. In 1830 he spent some happy months at Weimar, where he met Goethe. His ambition was to become an artist, and he traveled extensively on the continent, studying at Paris. His drawings are not without merit, being quaint, picturesque, and truthful; yet they lack the finish of the patient artist. He excelled in burlesque portraits, many of which have been preserved in the biographical edition of his works. Some of the best of these are found in the delightful correspondence, others were made for the amusement of his own and other people's children. In 1831 Thackeray began the study of law, but finding this profession uncongenial he went in 1834 to Paris, where he spent a part of the succeeding ten years. The bulk of his fortune, which probably amounted to considerably less than the £20,000 at which it is usually estimated, having been used up in foreign travel, speculation, and gambling, Thackeray devoted himself seriously to literature, contributing to *The Times, The New Monthly Magazine, Fraser's Magazine,* and other periodicals. Under the pen names

of M. A. Titmarsh, Fitz-Boodle, and others he published a great number of tales and sketches, but in contrast to the experience of his contemporary Dickens, his greatness as a writer was not recognized until comparatively late. By many critics of the present day his picaresque novel *The Memoirs of Barry Lyodon, Esq.* (pub. in *Fraser's* in 1844), is regarded as one of his most brilliant achievements, although it did not appear in book form in England until after its author's death. Other successful ventures from this period are *The Paris Sketch Book* (2 vols., 1840); *Comic Tales and Sketches* (1841), which includes *The Yellowplush Papers, The Second Funeral of Napoleon* and *The Chronicle of the Drum* (1841); and *The Irish Sketch Book* (2 vols., 1843). Soon after its establishment in 1841, Thackeray became a regular contributor to *Punch,* in which appeared *Jeames's Diary,* a continuation of *The Yellowplush Papers,* and the *Prize Novel* and the *Snob Papers,* the last of which was published in 1848 as *The Book of Snobs.* In 1853 Thackeray severed his formal connection with *Punch.* In 1840 occurred the great tragedy of Thackeray's life. His wife, to whom he had been married only a few years and to whom he was devotedly attached, lost her mind soon after the birth of a third daughter and remained in retirement until her death. In 1844 Thackeray visited the East for his health, his observations being recorded in *Notes of a Journey from Cornhill to Cairo* (1845). This book contains some of Thackeray's best descriptive writing. Thackeray's reputation was not finally established, however, until the appearance of *Vanity Fair* (1847-48), published in monthly parts and illustrated by the novelist himself, 'illuminated with the author's own candles,' as he expressed it. At first the novel attracted very little attention. According to Mrs. Ritchie, 'The sale of *Vanity Fair* was so small that it was a question at that time whether its publication should not be discontinued altogether.' But after the fifth number attention was directed to it by a favorable notice in *The Edinburgh Review* and by the appearance of *Mrs. Perkins' Ball,* which happened to strike the popular taste, and before its completion it was generally recognized as the most brilliant English satirical novel of the century. In 1848 Thackeray was called to the Bar, but never practised. In this same year he began a second social fiction, *The History of Pendennis,* completed in 1850, in which much of his own history and experiences is recorded. Next followed *Rebecca and Rowena,* a parody of *Ivanhoe,* with illustrations by his friend Doyle, and *The Kickleburys on the Rhine* (1850). The latter was sharply criticised by *The Times;* and Thackeray replied in a caustic and humorous *Essay on Thunder and Small Beer,* prefixed to a 2d edition of the satirical sketch. In 1851 the indefatigable novelist delivered a

course of lectures on *English Humourists of the Eighteenth Century*—light, graceful, discriminating studies, with passages of real power and eloquence. The following year he sailed for America for the purpose of repeating the course in a number of the large cities in the North and South. His success on this side of the Atlantic was no less pronounced than it had been at home. He was received everywhere with the greatest enthusiasm, his combined charm as a man and a writer commanding full recognition. But the chief result of his studies in the literature of the eighteenth century was the composition of his first historical novel, *The History of Henry Esmond, Esq.* (1852). This was the only one of Thackeray's novels not published in serial form and much of its unity and finish is undoubtedly due to this fact. By all modern critics it is recognized as the author's most artistic production and it is known to have been Thackeray's favorite work. By many it is given first place among English historical novels. *The Newcomes* (1853-55) was enthusiastically received at the time of its publication, and it still retains its power to please, especially in the person of Colonel Newcome, one of Thackeray's most sympathetic characters. In 1855 appeared the delightful children's story *The Rose and the Ring,* with characteristic illustrations by the author. In this same year Thackeray visited America for the second time, repeating his first success with a course of lectures on the *Four Georges.* Although Thackeray's main purpose in preparing these lectures was to provide for his daughters, he put his studies of the period to further literary use by the composition of *The Virginians* (1857-59), a sequel to *Henry Esmond* but vastly inferior both in plot and characterization to that work. In 1857 Thackeray stood for Parliament as a Liberal, but was defeated and made no further attempt to enter public life, for which he was unfitted both by training and temperament. In 1859 Thackeray accepted the editorship of a new periodical to which he gave the name *The Cornhill Magazine.* The first number appeared at the beginning of the following year with a brilliant list of authors. Thackeray's first contribution was his short and unimportant novel *Lovel the Widower* (1860-61), and this was followed by *The Adventures of Philip* (1861-62) and a series of pleasant, gossipy essays, *The Roundabout Papers,* in which Thackeray gives much of himself. In 1862, May, he resigned the editorship, which had become irksome to him in spite of the notable literary and financial success of the venture, though he continued as a contributor. His unfinished novel *Denis Duval,* which was regarded by Dickens as one of his most notable attempts, appeared posthumously in this miscellany.

THAIRMS. See THERMS.

THAIS, *thā'is:* Athenian courtesan, in the latter part

of B.C. 4th century; famous for wit and beauty, who was in Asia with Alexander the Great, and according to Cleitarchus—a doubtful authority—induced the Macedonian king, when excited with wine, to set fire to the palace of the Persian kings at Persepolis. After his death, she lived with Ptolemy Lagi, by whom she became the mother of several children.

THALAMIUM, n. *thăl-ā'mĭ-ŭm* [L. *thălămus;* Gr. *thalămŏs,* an inner chamber, a sleeping-room, a bed]: in *bot.,* the layer of reproductive cells in the apothecia of lichens.

THALAMUS, n. *thăl'ă-mŭs* [L. *thălămus;* Gr. *thalămŏs,* a sleeping-room]: in *anat.,* that part of the brain from which the optic nerves are partly derived; in *bot.,* the receptacle of the flower, or the part of the peduncle into which the floral organs are inserted. THAL'AMIFLO'RAL, a. *-mĭ-flō'răl,* or THAL'AMIFLO'ROUS, a. *-flō'rŭs* [L. *flos* or *flōrem,* a flower]: in *bot.,* having the petals and stamens inserted on the receptacle or thalamus.

THALASSID'ROMA. See PETREL.

THALBERG, *tâl'bĕrch,* SIGISMOND: eminent pianist and composer for the pianoforte: 1812-1871, Apr. 27; b. Geneva. He received the greater part of his musical education at Vienna, where he was pupil of Hummel. He made his first public appearance 1826, and his *début* in Paris in 1837; though in 1830 he had taken rank as a pianist with no rival but Liszt. After residing for a time in the United States, he returned to Europe. In graceful and brilliant execution, delicacy of touch, and manual dexterity on the piano, he was almost unrivalled. His compositions which are very numerous, are principally fantasias and variations.

THALER: dollar, German coin of silver, uttered first at Joachimsthal (hence *Joachimsthaler Münze,* shortened to *Thaler*): see JOACHIMSTHAL. The thaler was originally coined 1518 and bore the arms of the Herren von Schlik (who coined it), and effigy of St. Joachim. The present Reichsthaler is equal to 3 marks (gold), and is worth $0.714 (gold) in the United States.

THALES, *thā'lēz,* OF MILETUS: early Greek philosopher, founder of the Ionic or physical school of philosophy, and chief of the Seven Wise Men (q.v.): B.C. 640-546; b. Miletus, in Asia Minor. He is recognized as the founder of Greek geometry, astronomy, and philosophy. Very little is known regarding his life. He is said to have recommended the Ionians, who were menaced by the Persians, to form a federation against their powerful enemy, and to select Teos as the capital. At a later period, we are told, he induced the Milesians to withdraw from a union with Crœsus against Cyrus. He is also said to have predicted the eclipse of the sun which happened B.C. 585, May 28, in the reign of Alyattes;

and the abundant ancient testimony to this is now generally accepted so far as concerns Thales's predicting an eclipse for the year in which it occurred. His claim to the title of sage (as in the case of his compeers) was due to his practical wisdom rather than to his speculative achievements: nevertheless, Thales has a name in the history of speculative philosophy. He is even regarded by some as the *first* Greek that speculated on the constitution of the universe. He seems to have sought amid the variety of things one material cause. According to him, the original principle of all things is water; from which everything proceeds, and into which it is again resolved. It appears also that in connection with this doctrine he had some idea of a soul or force in water productive of all phenomena. None of Thales's speculations were committed to writing, and it is only from the notices of later Greeks, Herodotus, Aristotle, etc., that we can gather an idea of his thinking.

THALIA, n. *thă-lī'ă* [L. *Thalīa;* Gr. *Thaleĭ'a*—from Gr. *thallō,* I flourish or bloom]: in *anc. myth.,* the muse who presided over pastoral and comic poetry; one of the Graces (see CORYBANT) in *astron.,* one of the asteroids. THALI'AN, a. *-lī'ăn,* pertaining to Thalia; comic.

THALLINE. See under THALLUS.

THALLIUM, n. *thăl'lĭ-ŭm* [Gr. *thallos,* the shoot of a plant, suggestive of greenness], a metallic element discovered by Sir William Crookes (1861) in a deposit obtained from the lead chambers of a sulphuric acid works at Tilkerode in the Harz. On examining this deposit with the spectroscope the discoverer observed a single sharp and brilliant green line, which was afterward shown to be characteristic of this element. Crookes gave the element the name of thallium from the Greek *thallus,* a green twig. Thallium is found in many natural sulphides such as those of iron, copper, zinc, bismuth, etc. An important mineral containing it is Crookesite, a compound of sulphur, copper, silver and thallium. When iron or zinc sulphide is burned in the process of making sulphuric acid, the thallium burns to its oxide which collects in the flues or in the lead chambers. To obtain metallic thallium from this flue dust, it is dissolved in dilute sulphuric acid, filtered, and hydrochloric acid added. The slightily soluble thallium chloride separates. This is changed to the sulphate, purified of the various elements accompanying thallium, and the thallium sulphate decomposed by electrolysis or by action of zinc. Thallium, symbol Tl, has an atomic weight of 204, specific gravity 11.8 and fuses at 554° F. A freshly cut surface has a brilliant silver white lustre which is quickly lost by the oxidizing action of the air. It is softer than lead and is malleable. The metal dissolves readily in sulphuric or nitric acids, but

only slightly in hydrochloric acid. It forms two classes of compounds: the thallous compounds derived from the oxide Tl_2O, and the thallic compounds from Tl_2O_3. The salts of the first class resemble the corresponding salts of potassium and sodium. The chloride, however, resembles those of silver and lead in its insolubility in water. Thallium compounds give a green color to a non-luminous flame. They are very poisonous, resembling lead in physiological action. Thallium and its compounds are used in the manufacture of thallium glass, the high refractive power of which makes it valuable in the preparation of optical instruments and of artificial gems.

THALLOGEN, n. *thăl'lō-jĕn* [Gr. *thallos,* a young shoot; *gennăō,* I produce]: one of a large class of cellular cryptogamous plants, the lowest of the four great divisions of plants (see BOTANY), including slime-molds, diatoms, green slimes, algæ and fungi, usually consisting of thallus, and, if more differentiated, with no endogenous root and no root cap: called also THALLOPHYTE, *thăl'ō-fīt.* THALLOGENOUS, a. *thăl'ŏj'ĕn-ŭs,* pertaining to.

THALLUS, n. *thăl'lŭs,* THAL'LI, n. plu. *-lĭ* [L. *thallus;* Gr. *thallos,* a young shoot or branch]: in *bot.,* a solid mass of cells, without woody fibre, and consisting of one or more layers, usually in the form of a flat expansion, and having no morphological distinction of stem, leaves, and roots. Thallus assumes very various forms, sometimes crust-like, sometimes spread out like a leaf, simple, lobed, or branched; or, as in mushrooms, it becomes a stalk, cap, and gills. THAL'LOME, n. *-lōm,* any organ developed in the type of a thallus. THALLINE, a. *thăl'-lĭn,* pertaining to the thallus; in *bot.,* of the same substance as the thallus. THALLODAL, a. *thăl'ō-dăl,* in same sense.

THALMUD, n. *tăl'mŭd.* See TALMUD.

THAMES, *tĕmz* [L. Tam-*es*is; the root *tam* probably meaning broad, and *es*is or *is*is being identical with *esk, ex, ouse,* etc., all from Celt. *uisg,* water]: the most important river of Great Britain, and the longest in England; flowing e.s.e. across the s. portion of the country. Its remotest springs—those of the upper waters of the Churn—rise 370 ft. above sea-level on the s.e. slope of the Cotswold Hills, 3 m. s. of Cheltenham, 7 m. w. of the Severn at Gloucester. The springs unite about a mile from their sources, and form the Churn, which flows s.e. 20 m. to Cricklade, and there receives the Thames, which joins it from the west after a course of 10 m. The Thames, or Isis (which is the name of its upper course) then flows e.n.e. about 35 m., when, curving s.e., it passes Oxford, and flows on to Reading, where, after receiving the Kennet from the w., it changes to a generally eastward course, passing Windsor, Eton, Richmond, London, Woolwich, and Gravesend; a few miles below which it

expands into a wide estuary, and enters the North Sea. The tide rises to Teddington about 19 m. above London Bridge; and above that point navigation is by locks. The total length of the Thames from Thames Head to London Bridge is 170 m., to Sheerness 228 m.; area of its basin 6,100 sq. m. In the greater part of its course, it forms the boundary between several of the s. counties. Its chief affluents are the Coln, Leach, Windrush, Cherwell, Thame, Colne, Lea, and Roding, on the left; and the Kennet, Loddon, Darent, Mole and Medway, on the right. At Vauxhall Bridge, the width of the river is about 690 ft.; at London Bridge, 870 ft.; at Woolwich, 1,470 ft.; at Gravesend Pier, 2,400 ft.; 3 m. below Gravesend, 3,870 ft.; and at its mouth, between Whitstable and Foulness Point, about 8 m. below the Nore, it is 18 m. across. At the Nore Light, the commonly reputed mouth of the Thames, the breadth is 6 m. The river is navigable for barges to Lechlade, more than 200 m. from its mouth; and it is connected with the Thames and Severn, Oxford, Wilts and Berks, Grand Junction, and other canals, through which it has communication with the w. and s. coasts, and with all parts inland. Vessels of 800 tons can reach St. Katharine's Docks, while those of 1,400 tons can ascend to Blackwall, 6 m. below London Bridge. The part of the river immediately below London Bridge is called the *Pool;* and the part between the Bridge and Blackwall is called the *Port.*

THAMES, Canada: a river in the s.w. part of Ontario, rising in Perth co., and flowing s.w., 160 m., into Lake Saint Clair. It is navigable, 18 m. to Chatham, by boats of considerable size, but has a difficult bar at the mouth. On the banks of this river, about 30 m. above Chatham, a final stand was made by Gen. Proctor and Tecumseh, when pursued by Gen. Harrison in the War of 1812. The position chosen was poor and very favorable to the American advance. In 1813, Oct. 5, Harrison with 3,000 men attacked and by a vigorous charge of cavalry under Col. Johnson drove the British in great confusion from the field. Tecumseh was slain and Gen. Proctor himself barely escaped capture. The Americans lost 45 and the British 48, besides 33 Indians; 477 prisoners were captured.

THAMES, *tāmz,* River: in s.e. Conn., formed by the Quinebaug, Shetucket, and Yantic rivers, flowing s. 15 m. and emptying into Long Island Sound. Large steamboats ascend it as far as Norwich, at which point the Quinebaug and Yantic unite, the Shetucket emptying into the Quinebaug 3 m. above. The Thames affords an excellent harbor for New London, which is situated on it, 3 m. from its mouth.

THAM'MUZ. See Tammuz.

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